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A YEARLY REPORT OF THE PROGRESS OF THE GENERAL SANITARY SCIENCES THROUGHOUT THE WORLD.

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SURGERY OF THE BRAIN, SPINAL CORD, AND NERVES.

By JOHN H. PACKARD, A.M., M.D.,
PHILADELPHIA.

CEREBRAL SURGERY.

GENERAL CONSIDERATIONS.

On the general subject of brain surgery a number of important articles are to be noted. Horsley [113] read a paper before the Neurological Section of the Tenth International Congress on the "Surgery of the Central Nervous System." He advocates trephining in traumatisms of the brain, especially when there is severe and obstinate local headache; in pachymeningitis, and in all cases where the existence of a tumor is suspected. He believes that gummata are not amenable to medical treatment, and should be removed by operation (but there is certainly some experience against this view). He would tie the common carotid artery in cases of cerebral hæmorrhage, if called early. But the paper itself should be read.

This is, perhaps, the most appropriate place in which to mention a striking instance of the extension of the province of surgery in a new operation, to which has been affixed the name of *craniectomy*. (This term, according to analogy, should signify removal of the skull by a cutting operation; *linear craniotomy* would be more accurately descriptive of the procedure.) The condition which it is proposed to relieve, and which has been thus treated in several cases, is that known as microcephalus, or, more properly, microcephalia. [1127]

The idea is that the resistance of the imperfectly developed or prematurely solidified skull checks and stunts the natural growth of the brain, and children so affected are apt to be idiotic in a greater or less degree. Hitherto such cases have been regarded as beyond the reach of medical or surgical treatment, and as susceptible only of such slight improvement as might be brought about by patient efforts at training. It is now proposed to remove one

of the factors in the arrest of development by relieving the brain of mechanical compression, thus affording it opportunity to expand.

Guéniot $^{2}_{July\ 28}$ claims to have made the original suggestion of surgically relieving the brain of the pressure of a too small cranium, in a communication made to the Académie de Médecine in November, 1889; but Lannelongue $^{880}_{July\ 15}$ reported 2 cases in which he had carried out the idea with encouraging success, and Keen $^{9}_{Nov.\ 29}$ has operated in a nearly similar manner, the result of the cases, however, being not yet placed upon record. All of these cases were in children, and the condition congenital. But it should be noted that Bauer $^{786}_{Apr.}$ mentions a case in which he trephined a man, aged 27 years, for acquired microcephalia from an injury of the skull sustained sixteen years previously; very great improvement followed, the patient becoming able to go into business, and when seen six years later being in full health and mentally sound. Bauer reports that another case, that of "a young woman" (age not stated), in whom the condition was probably congenital, was operated on recently by him with some benefit; the procedure consisted in trephining at two points and removing the bridge of bone, the right parietal being first attacked and the left after an interval of about a month.

The operations performed by Lannelongue and by Keen were more extensive, so as to give ample room for expansion, the side of the head being made into a bony flap, attached below and free above. Lannelongue contented himself with dealing with one side only, the left; Keen operated on the right side, proposing to attack the other side later if the circumstances should seem to indicate such a course. The extent to which the bone was divided in Lannelongue's case was 9 centimetres (about 3½ inches) in length and 6 millimetres (about ¼ inch) in width; in Keen's the section was 6¼ inches long and ¼ inch wide, extending to within ¾ inch of the supra-orbital ridge, and backward nearly to the occipital bone. For cosmetic reasons, Keen made his incision of the skin entirely within the limits of the hairy scalp. A number of minor details are mentioned, which lack of space forbids me to repeat here. It seems likely that the initiative thus given will be followed in other cases. I have had the privilege of witnessing two of Keen's operations, and the procedure is certainly a brilliant one, of surprising ease in skilled hands. Further experience, and

especially, of course, the careful weighing of the ultimate results obtained, can alone warrant the formation of a judgment as to the merits of this new departure.

In this connection it may be mentioned that a number of cases have been reported by Burkhardt, [41 Oct.16] in which excision of portions of the cerebral cortex was performed upon the insane; it would appear that some improvement was thus obtained in the quieting of excitement and in the suppression of hallucinations.

Tuke, [2 Jan.4] discusses the surgical treatment of intra-cranial fluid-pressure, which he thinks is not awarded its true value. He gives 2 instances of "general paralysis of the insane," 1 of his own and 1 of Claye Shaw's, in which trephining was followed by marked improvement, and suggests that there may be other cases, characterized by coma, delirium, and acute mania, produced by a congested and dropsical condition of the brain, or by meningitis, in which an opening into the dura would be of advantage. He thinks that the importance of the lymphatic system of the encephalon, as a factor in morbid processes, has been too much overlooked.

In Shaw's case [2 Nov.14] there was a history of severe injury above the left ear fifteen months previously. After trephining, the patient, a man aged 29, improved in many respects, mentally as well as physically, but six months later he died after prolonged coma, preceded by strong convulsions. Cripps, [2 Nov.30,'90] who was the operator in this case, states that the treatment was adopted with the view of relieving undue pressure on the brain caused by excess of fluid within the cranium.

Revington [2 Nov.29,'90] has opposed the views of Tuke and Shaw, on pathological and mechanical grounds. He does not think that there is warrant for expectation of benefit from operative interference in cases of general paralysis of the insane.

In another case of general paresis trephining is reported by Wagner [278 July] to have produced marked improvement. But it seems likely that in this instance, as in some, at least, of those published heretofore, there were pressure symptoms superadded to those of general paresis; these being relieved by operation, there was, incidentally, an improvement in the patient's main disorder. One can hardly believe that it will be found possible to remedy a condition of degeneration, such as exists in the general paralysis of the insane, by any surgical procedure.

This subject is discussed by Percy Smith, $^{2}_{Jan.4}$ and attention is called to the fact that it is not uncommon for long periods of remission, or for real or supposed recovery, to be observed in cases of general paresis. Further, he quotes from Mickle the statement that several instances of recovery or of very prolonged remission have supervened on accidents, violent injuries, or diseases of such a kind as to produce so-called "revulsive effects."

In one of the lectures before referred to, Battle $^{2}_{July\ 19}$ gives some interesting instances of high temperature after head injuries. In several cases there was a rise after death; in one the mercury at death stood at 104° F. (40° C.), but rose later to 107° F. (41.66° C.); in another, at death, 106.2° F. (41.22° C.), later 108.8° F. (42.60° C.); and in a third, at death, 104.8° F. (40.36° C.), afterward going up to 110° F. (43.33° C.). A number of analogous observations are quoted, and the matter is one well worthy of further study. I may mention that in a case recently under my care, that of a lady aged 72, who died on the thirty-ninth day after a cerebral hæmorrhage which left her totally hemiplegic, the temperature rose about an hour before death to 105° F. (40.55° C.).

Church $^{779}_{Oct.}$ gives a valuable lecture on "Cerebral Cortical Localization and Brain Surgery," and the whole subject of the surgery of the brain is ably reviewed by Lyot $^{81}_{Sept.18}$ as well as by Carson. $^{65}_{July}$ Of rather more limited scope is an article by Seppilli, translated from the Italian, $^{119}_{Jan.}$ on "Endo-Cranial Tumors and their Treatment." Keen $^{9}_{Nov.1}$ deals with intra-cranial lesions, discussing the indications presented, the technique of operations, and the results obtained. Upon traumatisms of the brain Slajmer $^{8}_{Dec.,Jan.}$ has given a valuable communication based upon observations made at the surgical clinic of Wölfler, in Graz. Three lectures by Battle $^{2}_{July\ 5}$ on fractures of the cranium, and especially of the base, are well worth attentive study. Another notable contribution to the literature of the subject may be found in the "Essai Critique et Clinique sur le Traitement des Lésions Traumatiques du Crâne," by Forgues. $^{243}_{Nov.,Dec.}$

TUMORS OF THE BRAIN.

An important case of angeioma cavernosum has been very fully related by Bremer and Carson. $^{5}_{Sept.}$ The patient, a man about 23 years old, had suffered for about three years, his first symptom being spasm of the left arm and neck, which recurred twice daily

for six weeks, and was then attended with spastic paresis of the left foot; speech became difficult, and the head was drawn to the left; violent jerks in various parts of the body also occurred. The right foot gradually became spastic also, but the left was always markedly weaker. For the first three months he vomited every morning, and afterward less frequently. He had no vertigo, and his mind remained clear. Suspicions of a cerebral tumor, suggested by this history, were confirmed by ophthalmoscopic examination, revealing a beginning choked disk. On shaving the head, a small scar of old date was found, about 2½ inches above the external auditory meatus, and somewhat posterior to it. Just at this point a trephine was applied, and the opening thus made was enlarged until it was about 2 inches square. The dura, opaque and devoid of pulsation, bulged strongly outward; on its removal the brain protruded nearly an inch, reddish brown, compressible, and covered by abnormally vascular pia. The mass was readily scooped away, hæmorrhage giving some trouble. Afterward the cavity left was cleaned, a rubber drainage-tube introduced, the dura sutured, the removed bone replaced, and horse-hair drains laid under the skin-flap. Reaction took place well, and the patient's convalescence was uninterrupted. The space left by the removal of the tumor was thought to involve part of the ascending frontal convolution, extending somewhat into the base of the second frontal convolution. All the symptoms were relieved by the operation, seven weeks after which a slow return of tactility and muscular sensibility was noted.

Oppenheim and Koehler $\frac{4}{\text{July 28}}$ give an account of a remarkable case of glioma in the right parietal region, in a woman 36 years old, in the fifth or sixth month of pregnancy. She had headache and mental disturbance; a left monoplegia of the face and arm, with diminution of sensibility; the left leg was slightly paretic. The history was that these phenomena had, six months previously, supervened upon an attack of cortical epilepsy, beginning in the left side of the face, and later settling in the thumb and index finger. Although there was no choked disk, coma, vomiting, or slowing of pulse, the symptoms were judged to indicate the existence of a neoplasm in the right motor area. With the idea that this might be of syphilitic origin, treatment by inunction was instituted and continued for a month without effect. The cranium was

therefore opened (by "temporary resection," as proposed by Wolff and Wagner), and a cyst, judged to be a glioma, was found and emptied; its extent forbade its complete removal. Recovery was only interrupted by the occurrence of a small abscess in the fifth week, and all the symptoms were set aside. The woman was safely confined about four months after the operation. A case of Jacksonian epilepsy, due to the existence of a branching sarcoma in a man aged 39, is reported by Frank and Church $\frac{5}{July}$; it was removed by trephining, the buttons and fragments of bone being replaced, and for a time there was much improvement; but the symptoms recurring, with evidence of pus, the cranium was re-opened and a small abscess evacuated; a good deal of relief followed, but the prospect of permanent benefit was, of course, very slight.

In a case reported by Stoker, Nugent, and O'Carroll, $\frac{16}{Oct.}$ a spindle-celled sarcoma, spherical in form and about 1 inch in diameter, occupied the posterior portion of the parietal lobe; the symptoms produced were clonic spasms, mainly affecting the left leg, but in less degree the side of the trunk and the shoulder. There was no vomiting, no optic neuritis, no fixed headache. Under treatment some improvement ensued for about three months, but then the seizures returned; later, the hand was affected and became paretic, and there was mental hebetude, passing into unconsciousness. An operation was performed, the cranium being opened over the upper part of the Rolandic fissure; no tumor was found, but there was evident relief of pressure, the brain bulging strongly into the trephine hole. Ten days afterward a hernia cerebri appeared, and there was extensive sloughing and suppuration of the brain-substance. Death ensued three weeks after the operation. In this case it seemed that the leg-centre extended farther back than is usually taught, and that it was behind that for the thigh; also that there was "referred pressure," so that the arm- and face- centres were engaged by a small growth at the back of the leg-centre, sometimes even when the latter was not affected.

In a case reported by Maudsley, $\frac{1000}{Jan.}$ a gentleman aged 30, temperate, non-syphilitic, and without history of injury, had suffered first from headache, to which was added vomiting and, later, giddiness; then blindness, deafness in the left ear, and paresis of the left arm and leg; the face became asymmetric. The right

pupil was widely dilated, and both optic disks were in a state of white atrophy. Trephining was performed so as to expose the left lobe of the cerebellum, which bulged strongly and was found diffluent; there seemed to be a solid nodular growth fixed to the petrous portion of the temporal bone. Another opening was made, and a hollow needle passed in the direction of the lateral ventricle, but without result. Relief ensued to all the symptoms except the blindness and the deafness in the left ear. Fifteen months later he continued in the same state,—a fact which seems to show that the tumor was not a glioma. A somewhat similar case, in which a cerebellar cyst was discovered post-mortem, was referred to by Verco.

Parker[2 Nov.20,'99] has recorded the case of a man, aged 38, who had long-standing headache and, later, mental dullness, followed by almost total paralysis of the left arm and distinct weakness of the left leg. Iodide of potassium was given without benefit for three weeks. Trephining over the right Rolandic area was then performed, and a rounded tumor as large as a walnut was shelled out with the fingers. Suppuration and, later, a cerebral fungus gave some trouble, but eventually a good recovery ensued. The urgent symptoms were at once relieved. Later information pointed to a syphilitic history, and microscopically the tumor seemed to be a gumma infiltrating the cortex. In favor of this view was the fact of the absence of optic neuritis as a clinical symptom. Another case is recorded by Moore and Jones[105 Mar.1] in which the patient had had an attack of right hemiplegia, followed by convulsions and, two years later, by a second hemiplegia. Trephining over the left Rolandic fissure was performed and a tumor removed, with relief. The patient a few days after became again hemiplegic, and remained so for seventeen days, but went into the country and recovered completely.

Stoker[16 Aug.] reports a case of spindle-celled sarcoma at the upper back part of the parietal lobe, which caused spasm and, later, paralysis, commencing in the leg and extending to the trunk, upper extremity, and face; the arm-centre was affected by "reference." Neither optic neuritis, fixed headache, nor vomiting were present. Clarke[6 Mar.1] reports a case of chronic syphilitic new growth in the dura of a man aged 47, which had given rise to violent convulsions beginning in the right great toe; there was right hemiplegia, com-

plete in the leg and nearly so in the arm; motor aphasia. Trephining was performed and the growth removed as far as possible; the button of bone was replaced. On the sixth day the temperature rose, hemiplegia became almost complete, and he was partially comatose; the button of bone and some pus were removed, but he grew worse and died comatose on the nineteenth day after operation. The calvaria was found dense and thick and the dura adherent; beneath the latter was an abscess-cavity, and near this two masses of new growth. The irritation caused by the replaced button of bone was assigned as the cause of the suppuration. Much difficulty attended the diagnosis in this case.

Morse[77] has reported the case of a man, aged 39, who suddenly became giddy while at work, and fell unconscious; after this there was continual headache, vertigo, and mental dullness; convulsions of the left upper limb, with emesis, ensued. Iodide of potassium was given without effect. Trephining in front of the right parietal eminence was performed and the opening enlarged, revealing a cyst, which was evacuated. About twenty convulsions followed within a few hours; next day the left upper extremity was totally paralyzed, but there were violent movements of the right side, requiring restraint. Death occurred the next day. An autopsy showed, at the lower third of the Rolandic fissure, an indurated mass, having the characters of a round-celled sarcoma.

Several cases of hydatids have been placed upon record. Castro[75] reports an instance in which a boy aged 14 had for five months been subject to left-sided headache, with vomiting; the right arm and leg were paretic and atrophied. Antisyphilitic treatment was tried, but without effect. Upon trephining over the Rolandic fissure, a soft, black tumor the size of a walnut was exposed and curetted out. On the seventh day the wound was swollen, and next day a tumor the size of an egg distended the scalp; on the following day the cicatrix gave way, and a large cyst, with several living echinococcus-sacs, escaped. Some days later another came away. The patient died of basilar meningitis eight days afterward.

Another interesting case is recorded by Graham and Clubbe.[267] A boy of 16 had had, six years previously, a fall, followed by two days of unconsciousness. Recently he had gradual failure of memory, frontal headache, giddiness, and nausea; the sight of the left eye

failed, and the right arm and both legs became weak. Post-neuritic atrophy of the disks was noted in both eyes. Under bromine and iodide of potassium in full doses there was some improvement; but he had a severe fit one night and the symptoms recurred. Trephining over the left Rolandic fissure was performed, and a hydatid cyst was removed. For the first fourteen days afterward his condition varied greatly, but steady improvement then began, and he recovered except as to sight.

In connection with this case, Fiaschi read a paper [267/Aug.15] on the surgical treatment of intra-cranial hydatids, which disease, it would seem, is very prevalent in Australia. He thinks operation should be earlier resorted to, and advocates the method proposed by Souchon, of exploring the brain by means of a drill, through the hole made by which an aspirating needle of large size could be introduced; the examination of the liquid withdrawn might, he thinks, throw some light on the diagnosis.

Another case may, perhaps, be appropriately mentioned here, in which a woman, aged 40, who had actino-mycotic abscesses in connection with two ribs, developed brain symptoms; trephining over the middle of the right descending parietal convolution gave exit to thin green pus, containing quantities of actinomyces-grains. Much relief ensued, but the symptoms recurred, and, in spite of a second operation, the patient died, when an encapsuled abscess, deep in the substance of the brain, was detected. This almost unique case is recorded by Keller, [2/Mar.29] who urges the importance of thorough removal of the abscess-walls by scraping.

An extraordinary case of cystic disorganization of a very large portion of the right half of the cerebrum, unsuccessfully trephined, is reported by Hammond. [1/Sept.27] The patient was a woman aged 19, and the symptoms had existed almost from birth, in the shape of epileptiform attacks, with mental feebleness and derangement.

A case of hydro-encephalocele, operated upon by Wölfler with fatal result, is reported by Göbl. [8/June.29] The patient was a boy 7 years old; the tumor extended from the root of the nose to its tip, and was divided by a furrow into a larger portion on the right, a smaller on the left; it did not pulsate nor change with respiration. Puncture gave exit to 150 grammes (5 ounces) of clear, serous fluid, and pulsation was then noted in the tumor, showing prolapse of cerebral substance. The right portion was then opened,

the brain-substance pushed back within the cranium, the dura ligated and removed. Febrile reaction ensued; suppuration, with headache and vomiting; pus formed in the other sac, which was opened. For several weeks all went well, but then the temperature rose, there were signs of brain irritation, epileptiform convulsions, unconsciousness, and death seventy-two days after the operation. Suppurative meningitis was found, extending to the ventricle. The sac on the right side was free from pus.

Pott[366 May 8] gives the history of a case of chronic hydrocephalus in a girl 4 weeks old, in whom pressure symptoms were marked; there was hebetude, a spastic condition of the arms and in less degree in the legs, exaggerated reflexes, and shallow breathing. The child was badly nourished. Iodine and, subsequently, puncture having been tried without benefit, incision and drainage were resorted to. Some relief was thus afforded, but suppuration ensued, and twelve days later the child died. The autopsy showed imperfect brain development and universal anæmia. The author thinks efficient antisepsis is difficult to maintain when the dressings must be so frequently changed; but he believes that in well-selected cases the results of incision and drainage will be better than those of the other methods hitherto employed.

Thorburn[90 June] gives an interesting *résumé* of the views of Hildebrand, Trechsel, Berger, and Bergmann on the nature and treatment of congenital encephaloceles, including meningoceles and hydro-encephaloceles. It would appear that surgical interference in these cases promises very little. Berger,[8 Jan. 15] however, advocates extirpation by ligation and excision when the tumor is large, tense, and with thin walls, or when it is of rapid growth, citing 2 successful cases of his own. In the naso-frontal, naso-ethmoidal, and naso-orbital forms, Bergmann advises the same plan, supporting his view by 1 case of his own and 2 treated by another surgeon. Mittendorf[59 Apr. 5] has reported a case in which he removed a frontal encephalocele from an infant, 6 days old, with brilliant success. Trechsel's paper[214 Dec. 15] is very full, and well worth reading.

ABSCESS OF THE BRAIN.

Sheen[2 Feb. 1] gives an account of a boy, 12 years of age, who was struck by a stone in the forehead, to the left of the mesial line. A day or two after, he was drowsy and became amnesic; about six

weeks later his right leg became weak, and then right-sided hemiplegia ensued. When seen he was unconscious and hemiplegic, blind, with double optic neuritis and paresis of some of the intra-orbital muscles. Two weeks later two right-sided convulsions occurred. Trephining was performed at two points: (1) close to the wound-scar, a grooved needle bringing away a few drops of pus after several efforts; (2) over the middle of the fissure of Rolando; here about 10 drachms (40 grammes) of pus came away. A large drainage-tube was inserted. On reaction some improvement was noted as to pressure symptoms; but on the seventh day he began to fail, herniæ cerebri appeared in both wounds, and on the twenty-third day death ensued from exhaustion. At the autopsy it was found that the drainage-tube entered the left lateral ventricle, which constituted practically a large abscess-cavity, surrounded anteriorly by a mere shell of brain-substance; this latter, like the rest of the left hemisphere, was softened and diffluent. A small amount of greenish-yellow pus existed in the subarachnoid space at the base.

Verco and Stirling[1000 Jan.] have reported a case in which a man, aged 29, had, as the result of middle-ear disease, cerebral abscess of sudden onset and rapid progress. The central part of the left temporo-sphenoidal lobe being considered to be the seat of trouble, trephining was done 1½ inches above and ½ inch behind the auditory meatus. Pus was removed from the surface of the dura and from a deep abscess in the substance of the brain; drainage by a tube was instituted. Only partial relief of the symptoms followed. On the ninth day hernia cerebri had appeared. Coma gradually came on, and death ensued on the thirteenth day. An autopsy showed very considerable inflammatory degeneration of brain-substance, with a tendency to necrosis; one sinus passed into the cavity of the left lateral ventricle; the petrous portion of the temporal bone was somewhat extensively necrosed.

Roy[117 Oct.] relates the case of a man aged 42, a hard drinker, who was struck on the head with a hammer. The wound healed in two weeks, but there was continuous headache, and in the fifth week an access of delirium. Three weeks later he was found to have partial paralysis of left side, face, arm, and leg; sensibility diminished in left arm; incontinence of urine. There was a scar in the forehead, in the median line. Trephining was done over the motor area (under carbolic spray), and after several attempts

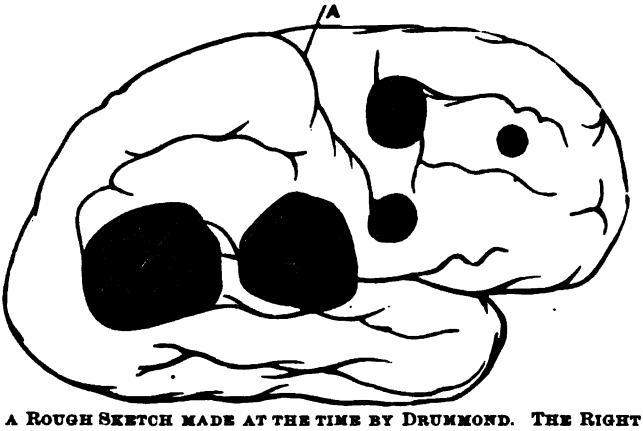
an abscess was entered, and 6 ounces (192 grammes) of pus drawn off. Some necrosed brain-tissue was curetted away and a drainage-tube inserted. Death ensued six hours afterward.

Lawson[6] reports a case of traumatic abscess of the brain in a boy, aged 8 years, who had been struck with a bar of iron five weeks previously. His main symptoms were vomiting, drowsiness, and slow pulse. A tender scar was found at the junction of the frontal and right parietal bone. Trephining was performed and a deep abscess opened. A good deal of relief followed, but the symptoms returned, and on the fifth day there was protrusion of pulsating brain-substance; this resisted treatment very obstinately, and nearly a year elapsed before it finally disappeared.

Murdoch[96] records a case of cerebral abscess, occurring eleven days after a blow on the head, in a boy aged 15: the lesion corresponded in situation to the upper part of the Rolandic fissure, and was relieved by trephining; a hernia cerebri followed, which was finally ligated with a rubber band, and gave no more trouble. In a case reported by Saenger and Sick[69] the chief symptom of an abscess in the left temporal lobe was sensory aphasia. The patient was a man 50 years old, who seemed to be mentally unsound. He could give no account of himself; did not answer questions, but always pointed to his left ear, which was greatly swollen, so that the meatus was a mere fissure, from which flowed a little offensive pus. This swelling became less in a few days, so that the swollen, bluish membrana tympani could be seen. His pulse was slow and the bowels obstinately constipated. Later, there was right-sided facial paralysis and the right hand showed weakness. Trephining was performed and an abscess opened in the posterior third of the first temporal convolution; this was emptied and the cavity curetted. Complete recovery ensued, although somewhat delayed by the occurrence of a hernia cerebri on the fourth day; this was not wholly overcome for more than four weeks. Deafness of the left ear still persisted, and was probably permanent.

Williamson[2] reports the case of a boy, aged 15, who was struck on the forehead by a rivet which flew from a machine at which he was working. Six months later he came under notice, having suffered since the accident with "fits," beginning at the left side of the mouth; severe frontal headache, vomiting, and

acute double optic neuritis were present. Growing worse, he was trephined on the right side, the point aimed at being the face-centre; an abscess was opened and curetted. Some temporary improvement followed the operation, but then the symptoms recurred, he became entirely blind, and died on the eleventh day, having been in coma for forty-eight hours. An autopsy showed that the abscess opened was only one among five, situated as shown in the diagram. The ventricles were free from effusion; the substance of the right cerebral hemisphere was very soft. Drummond suggested that a less severe operation for exploring the brain would be to drill a hole through which a needle might



COPY OF A ROUGH SKETCH MADE AT THE TIME BY DRUMMOND. THE RIGHT SIDE OF THE BRAIN, OUTER SURFACE. THE FIVE SHADED CIRCLES REPRESENT THE ABSCESSES. THE ONE OPENED IS AT THE LOWER END OF THE FISSURE OF ROLANDO.

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be passed,—an idea previously put forth by Souchon. (See ANNUAL for 1890, vol. iii, A–19.)

Murdoch [161 Dec., '90] reports an instance in which a boy had a small scalp wound on the left side and a severe burn on the right side of his head. Three or four days afterward, at the site of the latter injury, sloughing occurred, and the bone was exposed; the boy became stupid, sleepy, and irritable, and a few days later had left hemiplegia. Trephining was performed through the apparently dead bone, and after some search an abscess was opened and about ½ ounce (16 grammes) of pus escaped. Two days afterward the foot and hand were movable, and the boy made a good recovery.

In a case related by Schmid [61 July 30] a man received a blow on the head with a beer-glass; the wound healed, but left a small fistula,

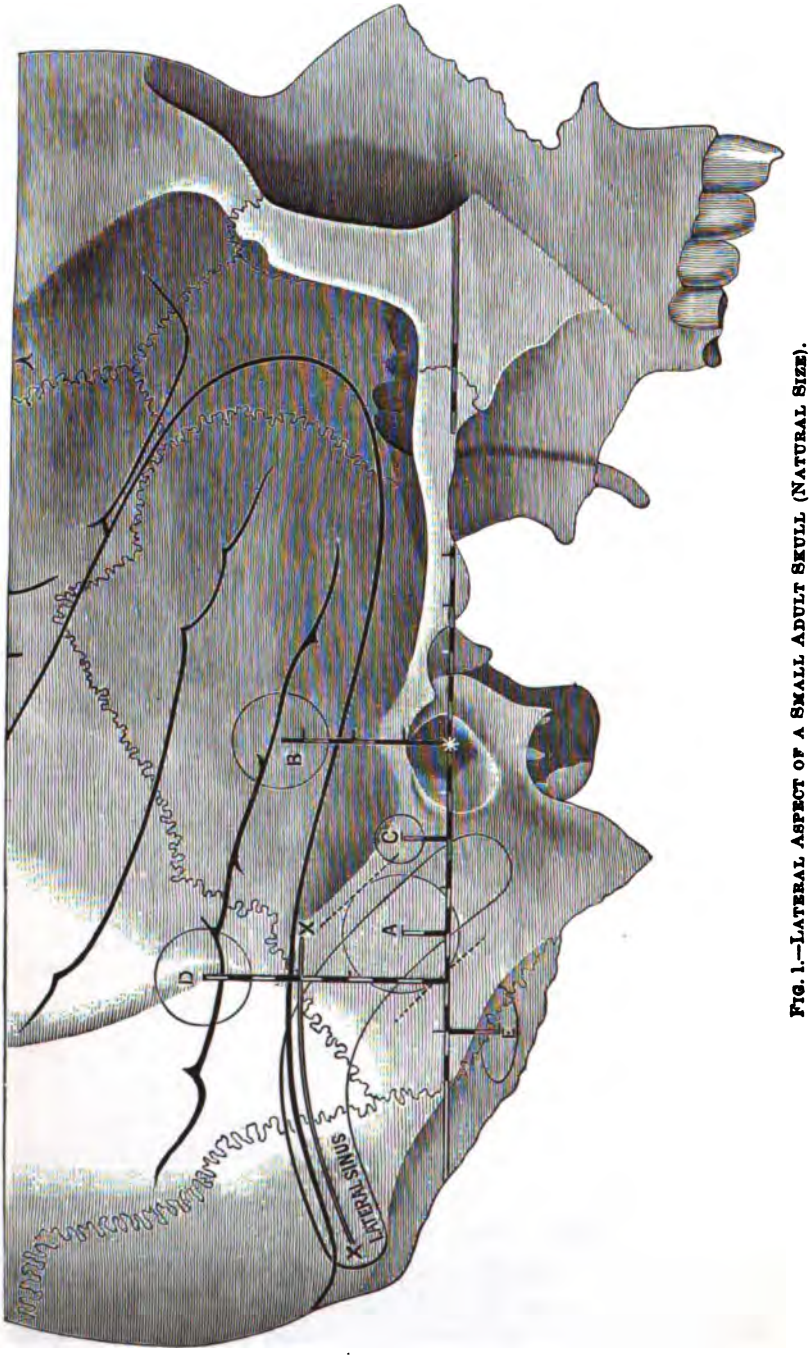

FIG. 1.—LATERAL ASPECT OF A SMALL ADULT SKULL (NATURAL SIZE).
(*Lancet.*)

The illustration shows the relations of the lateral sinus to the outer wall of the cranial cavity and the position of the trephine opening (A) which should be made when it is deemed necessary to expose it. The base line (Reid's) passes through the middle of the external auditory meatus and touches the lower margin of the orbit. It is marked out in eighths of an inch, as are also the perpendicular lines drawn from it. The measurements are made along the base line from the middle of the bony meatus. The drawing also shows the convolutions of the temporo-sphenoidal lobe, the Sylvian fissure, and the position of the lower end of the furrow of Rolando. X X indicates the site of the tentorium as far as it is in relation to the external boundary of the skull. The anterior X shows the point where the tentorium leaves the side of the skull, and is attached to the superior border of the petrous bone. A, trephine opening to expose sinus, $\frac{5}{8}$ inch in diameter, its centre being 1 inch behind and $\frac{1}{4}$ inch above the middle of the bony meatus. This opening can easily be enlarged upward and backward and downward and forward (see the dotted lines), by suitable angular-cutting bone forceps. It is always well to extend it forward, so as to open up the mastoid antrum (C) and the gutter of the carious bone (if there be one) which leads from the antrum, tympanum, or meatus, down to the bony groove. The position of the trephine openings which must be made for the relief of inflammatory intra-cranial affections secondary to disease of the ear other than for sinus pyæmia have been added to the drawing for the sake of contrast and completeness. They are as follow: B, trephine opening to explore the anterior surface of the petrous bone, the roof of the tympanum, and the petro-squamous fissure, $\frac{1}{2}$ inch in diameter, its centre being situated a short inch ($\frac{7}{8}$ inch) vertically above the middle of the meatus. At the lower margin of this trephine hole a probe can be insinuated between the dura and bone, and made to search the whole of the anterior surface of the petrous. C, trephine opening for exposing the mastoid antrum, $\frac{1}{4}$ inch in diameter, and $\frac{1}{2}$ inch behind and $\frac{1}{4}$ inch above the centre of the meatus; or $\frac{1}{4}$ inch above the centre of the meatus and $\frac{1}{4}$ inch behind its posterior border. The trephine should be directed inward and slightly downward and forward. When a superficial disk of bone has been removed, it is well to complete the operation with the gouge. A larger trephine may with advantage be employed, especially in adults. D, trephine opening for temporo-sphenoidal abscess, $\frac{1}{2}$ inch in diameter. Situation recommended by Barker, $1\frac{1}{4}$ inches behind and $1\frac{1}{4}$ inches above centre of meatus. The needle of the aspirator is to be directed, at first, inward and a little downward and forward. E, trephine opening for cerebellar abscess, $\frac{1}{2}$ inch in diameter, and $1\frac{1}{2}$ inches behind and $\frac{1}{4}$ inch below the centre of the meatus. The anterior border of the trephine should just be under cover of the posterior border of the mastoid process. The drawing shows that a trephine hole made in this situation is far away from the lateral sinus, and that the trocar and canula of the aspirator, if directed forward, inward, and upward, would hit an abscess occupying the anterior part of the lateral lobe of the cerebellum, which is the usual site of collections of pus in this part of the brain.

and epileptic attacks ensued, always beginning in the right lower extremity. Seven months after the injury trephining was done at the seat of the fistula, and an abscess containing 4 or 5 drachms of pus was opened. The convulsive attacks ceased, and rapid recovery took place.

A case is recorded by Konrád, [75 Nov. 1] in which a peasant, 18 years old, was struck on the side of the head; aphasia and agraphia ensued, and a portion of the left parietal bone was felt to be movable beneath the scalp. In a few months the symptoms disappeared and the man felt well, although he was excitable; nine months later epileptic attacks began and recurred constantly, starting always from the right side. In one of these he moved in a circle for two days and a night. Afterward insanity developed itself. He was trephined and an abscess opened and emptied, in which process the upper wall of the ventricle was torn. The man felt much better, was quiet, and asked for food; but died two days later with symptoms of meningitis. An autopsy showed another abscess in the frontal convolution, secondary degeneration of the pyramidal body, and meningitis.

An interesting and important paper has been published by Ballance [6 May 17] on the removal of pyæmic thrombi from the lateral sinus. This very grave lesion would appear to be by no means an infrequent cause of death in "ear disease." Ballance urges, and supports his view by 4 cases, that surgical interference at an early stage affords the only hope of averting the fatal result. The diagnosis having been made out, the sinus is exposed by applying a trephine 1 inch behind and ¼ inch above the mid-point of the bony meatus. (See Fig. 1, p. 14.)

Upon determining its plugged condition, the internal jugular vein is cut down upon in the neck, tied at two points, and severed between them. The entire seat of disease is now thoroughly cleansed of clots, pus, inflamed or necrotic vessel-wall, and bone; for this purpose the syringe and sublimate solution and the scoop are used. Upon the constriction of the vein the face and lips become blue, but this is only temporary. It will be seen that the ligation of the vein is an essential feature of the whole plan, as preventing the entrance of septic material into the general circulation; and that if this has already occurred the success of the whole procedure is so far endangered.

The space at command will only allow of brief mention of the diagnostic marks of pyæmic thrombosis of the sinus, as distinguishing it from typhoid or enteric fever: long-existing previous

FIG. 2.—HORIZONTAL SECTION OF THE RIGHT TEMPORAL BONE (NATURAL SIZE) ON A LEVEL WITH THE CENTRE OF THE CIRCLE A IN FIG. 1, A IN FIG. 1 BEING THE CIRCLE WHICH INDICATES THE POSITION WHICH A TREPHINE OPENING SHOULD OCCUPY IF IT BE DESIRED TO EXPOSE THE LATERAL SINUS.

E. A. M., the external auditory meatus; I. A. M., the internal auditory meatus: + +, the roof of the tympanum; A A, the horizontal limits of the trephine opening; these letters correspond to the horizontal diameter of circle A in Fig. 1. The illustration shows how the posterior surface of the petrous bone can be explored from the trephine hole made to expose the sinus. The angle between the posterior surface of the petrous bone and the bony groove for the sinus is the cause of the difficulty in passing the probe. This angle is very marked in some skulls, and in these considerable difficulty may be experienced in introducing the probe. The probe must be made to press backward the dura mater and sinus, filling the groove, until its point is able to ride on the posterior surface of the petrous bone. When the dura and bone have been separated by a collection of pus, the operation of passing the probe is of course greatly facilitated. The bent probes in the drawing indicate how best the exploration of this part of the petrous may be attempted. P. 1, the first position of probe; P. 2, second position of probe; P. 3, third position of probe.

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otorrhœa; sudden onset, with headache, rigor, vomiting, and pain in the affected ear; fluctuating temperature; vomiting from day to day; repeated rigors; local œdema and tenderness over mastoid and along the jugular vein; tenderness on deep pressure over the sinus; stiffness of the muscles of the neck; optic neuritis (not constantly observed).

Stoker [16/Aug.] reports a case of abscess in the right temporal lobe, from disease of the ear, in a girl aged 18; pain, retraction of the head, and right anosmia were the leading symptoms, and were all relieved by the removal of the pus, which was reached after nine exploratory punctures. Stoker points out that in order to reach the second temporal convolution the trephine should be applied 1¾ inches above the base line, instead of 1¼ inches, as directed by Barker. In a paper based on the examination of one hundred specimens, Birmingham [2/Sept.20] discusses the topographical anatomy of the mastoid region, and confirms the view above expressed by Stoker. An interesting case is related by Mackenzie, [557/Apr.] in which pus from an otitis media worked its way up through the antrum and perforated the inner table of the skull, which was softened and vascular; very grave head symptoms followed, which were set aside by free opening up of the mastoid antrum. Recovery was progressing, but not complete, at the time of the report. Salzer [57/June 22] operated on a girl of 11 for symptoms indicating cerebral abscess from middle-ear disease; a necrotic piece of dura was found and removed, but no pus was detected. There was, some days afterward, a sensation of falling from bed toward the left, and in walking the girl staggered to the left; this was thought to be due to injury to the semicircular canals. Lamarque [188/Apr.20] has reported a case in which, cerebral symptoms having supervened upon suppurative otitis, the mastoid process was trephined without benefit; after death, an autopsy disclosed abscess within the cerebellum.

A case of subdural suppuration is reported by Middleton [2/Apr.19] in a man aged 31, who had sudden pain in his left ear; in a week it shifted to the supra-orbital region and then to the vertex; some discharge occurred from the meatus. Tingling and paresis in right hand, with loss of speech and unconsciousness, followed, lasting several hours. Three days later his mind wandered, next day his right arm was weak, and the day after he was aphasic and his mouth was drawn to the left. After this his condition varied be-

tween dullness and excitement, and he had two "fits" affecting the facial muscles. Trephining was performed on the left side, in the temporo-sphenoidal region, and about 1½ drachms of pus spurted out from beneath the dura. No abscess was found on exploration of the brain. Very little improvement ensued; drowsiness and stupidity alternated with restlessness; at times respiration became slow; his memory of words was imperfect; twitching of the face was almost constant. Death took place on the fifth day after operation. At the autopsy the dura was found closely adherent to the arachnoid over the greater part of the surface in the left hemisphere. Large collections of pus were found on removing the dura over the ascending frontal and posterior part of second frontal convolutions, over the third left frontal and its immediate neighborhood. A distinct cup-like depression existed over the posterior extremity of the second frontal, but there was no deterioration of brain-substance. Between these deposits of pus there was a quantity of semi-purulent lymph, which existed also over the temporo-sphenoidal lobe and between the cerebrum and cerebellum. Some purulent effusion was noted beneath the left side of the pons and over the left third nerve. The ventricles were dilated with serum. This case, therefore, was one of suppurative meningitis, extending from the left ear.

Milligan and Hare[2] relate the case of a boy aged 14, who, when 8 years old, had had scarlatina followed by suppurative catarrh of both tympanic cavities. After 4½ years this stopped on the left side, and eighteen months later on the right side also. Severe pain all over the right side of the head then set in, with drowsiness, but no sleep, intense nausea, and distinct right optic neuritis. He was taken into hospital and grew worse. Trephining was performed just above and behind the auditory meatus; pus, however, was not found except by a needle thrust downward through the tentorium. The trephine was again applied below the lateral sinus, and an abscess was reached from which about 2 drachms (8 grammes) of intensely fetid pus escaped. Some relief was given, but death ensued in about twenty-two hours, apparently from interference with the respiratory centres. At the autopsy the abscess-cavity was found lined by a distinct membrane. The path of the infective process in this case was not easily traceable. Another somewhat similar case is reported by Bryden.[2] It was

that of a man aged 23, who had for years suffered from otitis media; severe pain came on, then symptoms of meningitis and twitching of the left facial muscles; coma ensued, and trephining was performed behind and a little above the left auditory meatus. No abscess was detected, and the coma continued until death, a few hours later. At the autopsy there was found a small abscess-cavity at the anterior and outer part of the left hemisphere of the cerebellum; patches of lymph were scattered along the longitudinal sinus, and about the torcular Herophili; there was no evidence of phlebitis.

A case is reported by Barrett[285 Sept. 15] in which chronic otitis media, with profuse suppuration, in a man aged 54, had perforated the membrana tympani and burst into the naso-pharynx; the mastoid was three times trephined with only partial relief, but by a fourth operation satisfactory drainage was provided and the patient fully recovered. Barrett[285 Sept. 15] mentioned the fact that, in experimentally trephining the mastoid in the post-mortem room, he had applied the instrument in the ordinary way, just behind the meatus and less than ½ inch from it, when, at the depth of less than ½ inch, the lateral sinus was entered. Of course, this would have been a most serious matter had it occurred in the living subject.

DURA MATER.

A case is recorded by O'Brien[206 Aug., '80] in which a Lascar, aged 50, struck his head against an iron bar, and had as a consequence a small ulcer on the scalp, a narrow canal or sinus leading down through the bone to the dura, and sometimes discharging freely. A sudden rise of temperature to 103° F. (39.46° C.), and then to 105° F. (40.55° C.), with symptoms of compression, demanded trephining, which was done. The bone was found very thick, condensed, and eroded; an ounce (32 grammes) or more of pus escaped, apparently formed outside the dura. Much improvement ensued and continued for three days, when there were evidences of pyæmia, which proved fatal a week after the operation.

De Ross[336 Oct. 25, '80] reports 2 cases of abscess between the bone and the dura in the temporal region, burrowing down into the neck. In one, that of a man aged 43, recovery took place after the chiseling away of the mastoid process and the opening of the sinuses in the neck. The other patient, a woman aged 57, was treated in

like manner, but on the fifth day had a chill, repeated daily until she died, on the fourteenth. At the autopsy it was found that there was extensive caries of the upper two cervical vertebræ. The author, in view of the difficulty of diagnosis of these extra-dural abscesses, urges the importance of recording cases of the kind.

In a case of idiocy, in a boy aged 8, who had had continuous general chorea for seven years, Frank and Church $_{July}^{5}$ trephined over the motor area on both sides. The only abnormality found was great thickening of the dura; brain-tissue was removed on each side, from the ascending gyri, about 32 grains (1 gramme) in all. The choreic movements ceased, but the boy died on the third day from no apparent cause. There was no autopsy.

INTRA-CRANIAL HÆMORRHAGE.

Extra-Dural.—In an article upon this subject, Deaver $_{Feb.15}^{9}$ discusses the mode of causation and the diagnosis of lesions of the middle meningeal artery (the one usually involved), and urges the importance of early trephining in such cases, illustrating it by a clinical history. Another article on injuries of that vessel, by von Fillenbaum, $_{Apr.3}^{8}$ takes the same ground, in defense of which a number of instances are cited. Somers $_{Oct.}^{147}$ reports a case in which a man aged 25 sustained a stellate fracture through the left parietal bone, causing right-sided hemiplegia. Several buttons of bone were removed with the trephine and an enormous clot evacuated, the separation between the bone and the brain (dura?) being fully 1½ inches, and the finger passing readily round to the falx above and to the tentorium behind. Within three hours consciousness returned, and the power of speech. Next day the paralysis had disappeared, and on the fifth day the man insisted on his discharge. Walker $_{Aug.22}^{19}$ reports a case in which trephining was successfully resorted to for the removal of an extra-dural clot, amounting to 5 fluidounces (150 grammes), the result of an injury received six days previously. Paralysis of the left arm and leg, contraction of the left pupil, and semi-coma were the chief symptoms presented. The operation was done over the fissure of Rolando on the right side. An interesting case is reported by Ransohoff $_{Aug.}^{96}$ in which a man aged 28 fell about 8 feet, fracturing his right radius. On the eighth day afterward he suddenly became comatose, the right pupil contracted, the left dilated; the urine

contained sugar, and its specific gravity was 1040. Trephining was done over the left meningeal artery and an extra-dural hæmorrhage detected, a quantity of dark fluid blood and about 6 ounces (180 grammes) of clot being removed. Consciousness returned six hours afterward. Next day the urine was free of sugar; specific gravity, 1016. Nine days later profuse hæmorrhage occurred and ligation of the common carotid was performed. Pyæmia ensued, but seemed to be subsiding, when another hæmorrhage came on from the distal end of the carotid, and the man died ten hours after it was checked. The long interval between the accident and the onset of brain symptoms is especially noticeable in this case. Ligation of the carotid for such cause, of which only three other instances would appear to be on record, has been but once attended with success. Pilcher[96 Mar.] reports the case of a man, aged 45, who was struck on the head and sustained a linear fissure of the left parietal bone across the anterior branch of the middle meningeal artery; right-sided paralysis, with gradually deepening coma, was noted, and death ensued from respiratory failure. At the autopsy an extra-dural hæmorrhage was found, measuring 4 by 5 inches and an inch thick at its centre.

Intra-Dural.—In another case recorded by Pilcher, that of a lady aged 60, the hæmorrhage was within the dura, which, after trephining, was laid open, but to no purpose, death occurring from respiratory failure. In a case reported by Homans[99 June 19] a man was thrown from a horse and had a wound of the scalp, but no apparent fracture. Two days later his temperature rose to 103° F. (39.46° C.), with delirium, succeeded by an almost comatose condition, with aphasia. On the eighth day convulsions came on, and trephining near the lower end of the Rolandic fissure was performed. A large clot was turned out from beneath the dura and another from beneath the pia. There was much laceration of brain-substance. A drainage-tube was inserted, and was kept in place for eight days. All the symptoms subsided after the operation, although on the second night there were three slight convulsions.

McBurney[101 Feb.] records a case in which a physician aged 34 was thrown from a carriage, striking on his head; there was no evidence of fracture, but he became hemiplegic and aphasic. Power returned in the leg after a time. Trephining was performed four months after the injury, and a clot was found under the pia, filling

up the fissure of Rolando and the neighboring sulci; the operation was followed by improvement in the symptoms and a good ultimate result was to be looked for.

A case is reported[2 May 17] in which an old clot, the result of spontaneous cerebral hæmorrhage, had caused paresis of the right lower extremity, marked contraction of the right hand, and epileptiform attacks, which became more frequent and intense with the lapse of time. Believing these symptoms to be due to hæmorrhagic deposit in the ascending frontal convolution, Lucas-Championnière trephined over the middle of the left Rolandic fissure, found the clot encysted, evacuated the cyst, and washed it out antiseptically. The symptoms were all relieved; one attack of convulsions occurred two months afterward, but none in the ensuing four months, when the report was made. Thirty other cases of like operation for disease, performed by this surgeon, have been followed by no serious effects, but it could not be said that they were all successful in relieving the conditions for which they were undertaken.

Mills[242 Jan.] reports the case of a woman, aged 68, who was said to have been struck on the head while drunk. She died two days afterward, having presented symptoms of intra-cranial pressure in the eyes, limbs, and respiratory function. Blood was found effused beneath the scalp, as well as beneath the dura over the two upper convolutions of the right temporal lobe, and on the surface of the left cerebellar hemisphere at its anterior and lower border. There had been no hæmorrhage into the ventricles, although the source of the bleeding had been within the cerebrum. In a case of very severe fracture of the skull, involving both vault and base, in a girl aged 23, reported by Frank and Church,[5 July] trephining was done on both sides, and very profuse infra-dural hæmorrhage was found to have occurred. The symptoms of intra-cranial pressure which had existed were set aside, but consciousness never was regained, and death took place within twenty-four hours. Five fractured ribs and a corresponding rupture of the liver, from which the abdomen was filled with blood, more than accounted for the ill success of the operation.

TREPHINING FOR EPILEPSY.

Before entering upon this subject, I may note that, with regard to the treatment of epilepsy by ligation of the vertebral artery, Telford Smith[166 Oct.] gives the subsequent history of a case thus

treated in 1881 by Alexander, the originator of the method. The boy was then 11 years old; for four years he had no fits and improved mentally, but then the attacks recurred and he lost all he had gained. Alexander's later operation for epilepsy—removal of the upper cervical ganglia of the sympathetic nerve—is said by Kerr[50 Mar.1] to be followed by justifying results.

A clinical lecture by Keen[9 Apr.12] gives the details of an interesting case of focal epilepsy of four years' standing, in a boy aged 6, who had had a severe fall when 14 months old; the first epileptic fit occurred sixteen months afterward, during an attack of dysentery. He became irritable and ill-tempered, and had lost the use of all but two or three words. The convulsive seizures were very frequent, three to six daily, and seemed always to begin in the right hand. On exposure of the fissure of Rolando by trephining, there was no discoverable lesion, but the hand-centre was determined by means of a faradic current and that portion of the cortex was excised. One vessel required ligation; the button of bone was replaced and the wound dressed in the usual way. Marked improvement is reported to have taken place as the result of the operation.

A very instructive case is fully detailed by Beach,[99 Apr.2] in which a girl 4 years old was kicked by a horse, sustaining a compound comminuted fracture of the left side of the skull; next day several pieces of bone were removed. Abscess followed and a large amount of pus was let out; the wound was kept open and continued to discharge for six months. Four years afterward epileptiform attacks began, partly general, sometimes affecting the eyes alone, especially the left; later, the right hand was occasionally paretic, and sometimes the left. Her mind became deteriorated. Operation was decided upon. A flap, containing most of a crucial cicatrix, observed in the left posterior temporal region, was raised, and a web of cicatricial tissue occupying the gap in the bone at the site of the old fracture was exposed; from this there exuded some clear, fluid-like serum. This "collapsed cyst" was closely adherent to the edges of the bone, and was dissected away. From the anterior edge of the bone a sharp spicula projected inward, and was removed. A mass of firm, cicatricial substance was next excised from the cortex cerebri, and, after the bleeding was checked, the wound was closed without drainage. Rapid recovery ensued, and at the time of the report there had been no return

of the seizures,—a period of nine months. The patient had been regularly at school, and her mental functions seemed perfectly normal. It would seem that some of the symptoms in this case were due to an extension of irritation beyond the area of actual lesion.

A case is reported $\frac{112}{\text{Feb.}}$ in which a child 2 years old was struck on the head by a piece of slate, causing a simple wound over the sagittal suture. Healing took place readily, but the child became stupid, perverse, and irritable; he had also what his parents called "nervous spells,"—twitchings,—sometimes so severe as almost to amount to convulsions. A year after the injury the scar was excised by White, and the symptoms disappeared, the child becoming placid and manageable and free from twitchings.

A successful case of trephining for old hemiplegia, with severe headache and epileptiform seizures, is reported by White and Lane. $\frac{6}{\text{Feb.28}}$ The patient was a man, aged 29, who, fourteen years before, had twice fallen on his head. The bone and dura over the whole of the right Rolandic fissure were much thickened, and were removed; some of the bone was replaced. The improvement consisted in the cessation of the headaches and convulsions and in regained power in the left leg.

A case is reported by our collaborator, Bogdan, of Jassy, in which left hemiplegia and partial epilepsy supervened upon an exposure to cold and wet. Trephining was performed by Assaky over the right motor area, and a patch of yellowish-red softening was discovered, the congested pia being adherent to it. These adhesions were broken up. The patient, an intemperate man, aged 41, derived marked benefit from the operation.

Walker $\frac{19}{\text{Aug.28}}$ reports a case in which a man, aged 25, was struck just above and in front of the left ear, and was unconscious for two hours. For a year he had occasional dizziness, and then a right unilateral convulsion; attacks of this kind followed and became more and more frequent, but less violent. Aphasia and agraphia ensued. Four years and a half after the injury he was trephined over the lower part of the Rolandic fissure; the bone was very thin, and the thickened dura was adherent to it. Great improvement resulted in every way, except as to the aphasia.

A case is related by Rubio, $\frac{25}{\text{Aug.30}}$ in which a man, 48 years old, had a healed compound fracture of the right side of the frontal bone, in consequence of which he became morose and apathetic,

and had occasional attacks of loss of consciousness, as well as slight trembling of the left leg. He was trephined, and was greatly improved. It may be noted that the disk of bone was so damaged that it was not available for replacement; portions of decalcified bone taken from the tibia of a cow were therefore substituted for it with apparent success.

A case of trephining for Jacksonian epilepsy of sixteen years' standing, in a man 31 years old, is reported by Boucher [208 Sept.1]; the attacks were afterward milder and markedly diminished in frequency. This improvement lasting for two years, the reporter thinks it not impossible that a cure may ultimately take place; but he very justly says that he cannot be sanguine in regard to it. A case is reported by Thomas [2 Feb.1,'90] in which a man aged 39 became affected, from no apparent cause, with brachial monospasm and Jacksonian epilepsy. He had frontal headache and was occasionally wandering, with auditory hallucinations; there was no vomiting and no optic neuritis. After thirteen months of treatment, not improving, he was trephined by Sheen a little in front of the middle of the right Rolandic fissure; nothing abnormal was detected. For about a week he seemed to have been benefited, but then the attacks returned and he began to show more decided mental deterioration, although he gained rapidly in weight. Such a case would seem likely to result in total dementia.

Reports of cases of trephining for epilepsy are given by Larger, [91 Nov.10,'89] Dundore [144 Dec.,'89] (a traumatic case in a man aged 42, operated on twice, with relief), Salzer [8 Dec.5,'89] (cerebral tumor), Poulton, [267 Jan.15] Brulant and Baude, [181 Jan.24] Wyman [9 Feb.8] (tumor in cerebellum), Martin-Durr, [7 Feb.14] Wyeth, [1 Mar.8] Hoegh, [9 Mar.8] Reeve, [1 Mar.29] Koehler, [101 Apr.] McBurney, [9 May 8] Albert [2 Apr.12] (cerebral tumor of traumatic origin), Miller [6 May 10] (Jacksonian epilepsy of syphilitic [?] origin), Tansini [57 June 1] (traumatic), Osgood [157 July] (traumatic), Salzmann, [166 July] Taylor [23 Aug.] (2 cases), Boucher, [3 Aug.12] Warnots, [329 Sept.5] Maxwell, [202 Sept.26] Porter, [9 Oct.11] Navratil [75 Nov.1] (3 cases), Jaboulay. [211 Nov.16] Mention may be made also of an article by Wood, [180 Sept.] on the curative treatment of epilepsy by surgical means, and of another by Heydenreich, [3 May 7] on the history of trephining in epilepsy.

SURGERY OF THE VENTRICLES.

Keen, [6 Sept.12] in a paper read before the Tenth International Medical Congress, discusses the surgery of the lateral ventricles of

the brain. Operative access to these cavities has been hitherto attempted on account of chronic hydrocephalus, hæmorrhage, abscess, and rupture connected with compound or simple fracture of the skull. A careful study of the cases related and quoted by Keen will hardly be likely to tempt timid or conservative surgeons into this field; but they are as yet limited in number, and, for the most part, the operations were resorted to under desperate circumstances. The least unpromising cases would seem to be those of acute hydrocephalus. No great difficulty or danger is involved in the operation of opening the ventricles, which, according to Keen, is, as a general rule, most readily done by the lateral route. Horse-hair is preferred for the purpose of drainage, and the fluid should not be too rapidly withdrawn. If this mistake is made, as shown by the occurrence of convulsions, it may be rectified by the re-injection of the cavity with artificial cerebro-spinal fluid, or with any available innocuous substitute. Should hæmorrhage of traumatic origin occur into the ventricles, Keen advocates instant trephining and evacuation of the clots. The chief difficulty would seem to be not in the operation itself, but in deciding as to its necessity or propriety, and the chances of benefit from it, in any special case.

Robson [50 Sept. 12] advocates the tapping and drainage of the ventricles as a measure based upon the same principles as the opening of the abdomen. He cites the case of a boy, aged 10, in whom this was done with success, the symptoms having been high temperature (103° F.—39.46° C.), right hemiplegia and aphasia, right-sided twitchings, double optic neuritis, etc. This view was supported by Bruce Clarke and Kendal Franks (although the cases they cited had not ended favorably); but Wheelhouse opposed it, as he regarded the fact that the brain could not expand to fill the vacancy left by the withdrawal of the fluid as precluding the hope of success.

Tapping of the ventricles is reported by Walker [19 Aug. 28] in the case of a man, aged 49, for supposed effusion. The trephine was applied 1¼ inches behind the meatus and the same distance above Reid's base line, a puncture being then made toward a point 2½ inches above the opposite meatus; a large-sized hypodermatic needle was first employed, then a grooved director, and, finally, a ¼-inch drainage-tube; a good deal of serous fluid was drawn off, with very temporary relief, coma ensuing, and death seven hours after the operation.

OPERATIVE SURGERY OF THE BRAIN.

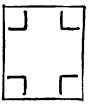
On the history of the operation of trephining there is an instructive article by Castex,[860 Sept. 15] also a review[336 May 10] of an inaugural dissertation by Albu on this subject.

The substitution of the chisel for the trephine, mentioned last year as obtaining to some extent in France and Germany, was strongly advocated by the late Prof. von Volkmann.[4 Dec. 16, '70] The saw or trephine, he thought, instead of cutting the bone smoothly, tears through it and causes sawdust, apt to be driven into the skull-cavity; if the operation is done with elegant rapidity, unless the instrument is now and then douched with cold sterilizing solution it becomes heated, even to 60° R. (about 165° F.), and the blood becomes coagulated, causing small areas of necrosis in the bone; the dura is often wounded, and even the brain itself. In the opinion of this surgeon, the replacement of the removed portion of bone, more readily effected after trephining, is of small benefit to the patient, and a matter mainly of scientific interest. The objections above stated do not seem to be very strongly against the trephine except in awkward and unskillful hands, and it may well be doubted whether the chisel, thus wielded, would be in any degree safer. I am not aware that the use of the latter instrument has prevailed to any extent among surgeons outside of the countries named. It certainly has as yet found no prominent advocates in England or in America; and Prof. Küster opposed the views of von Volkmann on the ground of the greater violence involved in the use of the chisel and the consequent risk of "commotio cerebri," of rupture of abscesses into the ventricles, or of the rupture of weakened blood-vessels. He further urged that, in cases of mistaken diagnosis, the replacement of the button of bone removed by the trephine could at once be effected.

Salzer[8 Dec. 5, '70] advocates the use of the surgical engine in trephining operations for the purpose of removing the bridge of bone between two trephine-holes. He objects to the chisel, as its use involves rough manipulation, damaging to an already irritated and injured brain; and suggests that the concussion might cause the rupture of an abscess into the ventricle or the subarachnoid space.

"Temporary resection" of the skull is proposed by Wagner[336 Nov. 22, '70] as a substitute for trephining. His plan is to make an

incision in the scalp, shaped like the Greek letter Ω; then to divide the periosteum in a similar line, but a little within the former, and to cut through the bone with a chisel in the same line as the periosteum; the bridge of bone at the base of the Ω is then carefully severed subcutaneously with a very small chisel, when the flap of skin, periosteum, and bone can be lifted, so as to expose the dura. The object of this procedure must at once be apparent, as well as its theoretical advantages; whether it has practical value remains to be seen. In the only case in which Wagner has used it in the living subject it seemed to him to answer well, although the patient died at the end of twenty-four hours from the severity of his injury,—an extensive fracture of the base,—the pons and cerebral peduncles being partially torn through. Wolff[336 Jan. 4] claims to have brought forward this idea, supporting its claims by the results of experiments on animals, as long ago as 1863.

A modification of this procedure, suggested by Müller,[336 Jan. 25] consists in carrying a U-shaped section of the bone through the outer table only, and then, with the chisel applied flatwise, cutting through the diploe, so as to separate a portion of this along with the outer table; the attached part, at the open end of the U, will readily give way, so that the flap of skin, pericranium, and bone can be turned up; the inner table is then cut through separately. Von Andelberg[8 Oct. 16] speaks highly of Müller's modification of Wagner's method, and gives an illustrative case. A procedure apparently much more complicated, but on the same general principle, has been proposed by Toison[220 Nov. 7]; it has as yet been tried by him only on dogs and on the human cadaver. He cuts three sides of a quadrangle down to the periosteum; this flap is allowed to retract, and along its edge the periosteum is divided; then with a chisel the bone is carefully cut through so as to make an L at each of the corners of the quadrangle, thus:  A fine saw, such as is used by jewelers, is now passed under the bone, and three sides of the quadrangle corresponding to the incision of the skin are cut through; when, by means of an elevator, the plate of bone can be raised, the attached side yielding, and the "trap-door" of bone and skin turned back so as to expose the dura. Toison claims that this procedure is, in reality, as easily carried out and safer than that of Wagner or Müller.

Morris[1 Mar. 2] believes that in injuries of the brain and after opera-

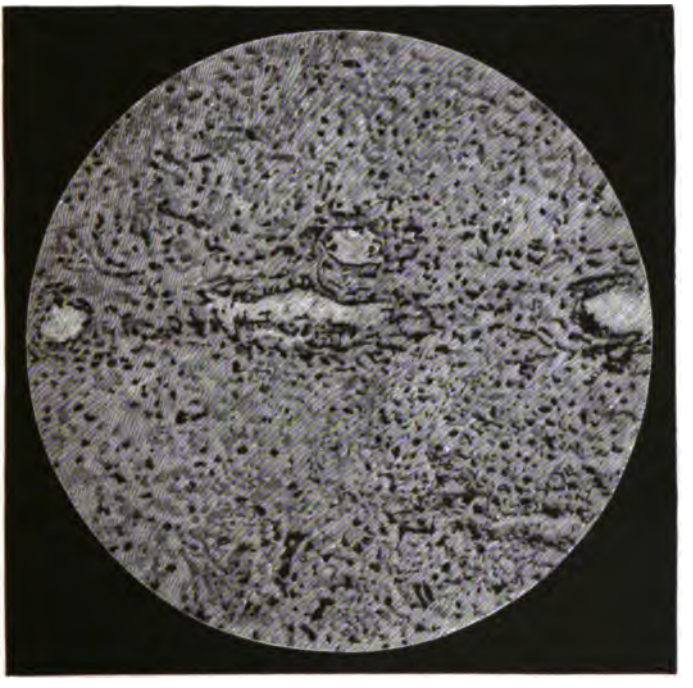
tion the best material for drainage is catgut, swollen by soaking in some antiseptic solution. Rubber tubes are objectionable, because the brain-substance is apt to protrude into them and to be torn off upon their removal, when bleeding may ensue. Absorbable bone drains he thinks preferable to these. Horse-hair, in his opinion, is more likely to cause irritation than catgut.

An ingenious procedure for the reparation of a deficiency in the skull is recorded as successful by König.[169 Sept.] A man aged 30 had, as the result of an injury to the head, mental hebetude and numerous epileptiform seizures; there was extensive loss of substance in the temporal and parietal bones on one side, and here pulsatile and respiratory (*sic*) movements were visible when he stood upright. In the immediate neighborhood of the gap there was cut out a flap consisting of skin, periosteum, and a thin layer of bone, with a pedicle of skin and periosteum only. Now the skin over the gap was turned away from over it, and one flap was substituted for the other, that containing the bony layer being placed over the hole in the skull. No fever ensued; union took place readily, and the patient recovered. The caution is given that in the formation of the bone-containing flap, in such a case, allowance should be made for shrinkage by making it about ½ centimetre wider all around than the space to be filled.

Celluloid is proposed by Fraenkel[8 June 19] as a suitable material for filling up defects in the skull due to injury or to the operation of trephining. From experiments on dogs, he states that it can easily be adapted, and is borne by the tissues without irritation. Hinterstoisser[113 Oct. 19] has used a plate of this material to fill in the loss of substance from trephining in a case of epilepsy from old comminuted fracture of the parietal bone, and states that it answered well, the wound healing over it *per primam.* Apropos of a case of Jacksonian epilepsy successfully trephined by him, Jaboulay[211 Nov. 16] discusses the re-implantation of the button of bone. He thinks it valuable as a preventive of hernia cerebri, but would not advise it when the dura is left intact, or when, this membrane being incised, there is pus, blood, or serum needing an exit; or when the cortex is exposed and would be apt to contract adhesions to the inner surface of the re-implanted bone.

A case is reported by Mason[6 Apr. 15] in which a boy 6 years old was kicked by a horse and a square inch of bone detached and

driven into the brain. The fragment was easily removed with forceps; on the ninth day hernia cerebri developed itself, and another loose piece of bone was detected and removed. Twelve days later the protruding mass was shaved off level with the skull, and again after a like period. About three weeks after this, the hernia cerebri having been controlled by pressure, about a dozen bits of fresh, sterilized bone from the cranium of a young rabbit were placed on the granulating surfaces; these, although they all



MICRO-PHOTOGRAPH OF A BRAIN-GRAFT.

The upper half represents a section through a cat's brain; the lower, a section through a dog's brain; the connective tissue uniting the two occupies the horizontal middle line.
(*London Lancet.*)

failed to become attached, seemed to stimulate the process of granulation, and cicatrization progressed rapidly as soon as they were put in. It is stated that several of them became distinctly vascular.

A curious experiment recorded by Thompson $\frac{1}{\text{June 28}}$ may be noted for its scientific interest, although its practical value does not at present appear. This observer removed equal portions of brain from corresponding localities (the left occipital region) in a cat and dog, and then grafted that from the cat in place of that taken from

the dog; the button of bone, which had not been completely detached, was then replaced. At the end of seven weeks the dog, whose condition had been normal with the exception of total blindness in the right eye, was killed, when the transplanted portion of the cat's brain was found firmly adherent, with the pia intact. Some shrinkage had taken place, and at a corresponding point on the opposite (right) hemisphere there appeared to be degeneration extending somewhat farther forward. The cut on the preceding page shows the microscopic appearance of a section, including the layer of connective tissue uniting the graft with the brain-substance in which it was set.

Ligation of the longitudinal sinus is reported by Kammerer[462 Jan. 1] as having been done by him in the course of an attempt at the removal of a sarcomatous growth of the dura in the occipital region. Two strong silk threads were placed around the vessel, which was then divided between them. Temporary impairment of vision, more marked in the right eye, followed a day or two afterward, and later there were severe and continual head-pains. Death took place about seven weeks after operation, and it was found that the tumor had been largely reproduced; there was extensive recent hæmorrhage in the substance of the left occipital lobe, especially on the anterior aspect of the tumor. Within the longitudinal sinus were adherent blood-clots, extending into the different veins.

FRACTURES OF CRANIAL VAULT.

A case of very extensive injury of the skull is recorded by Justo,[336 Sept. 25] The patient, 18 years old, was struck by the buffer of a railway-wagon, and had compound fracture of the left parietal bone, with copious escape of blood and brain-substance. The posterior part of the fracture corresponded to the level of the Rolandic fissure. There were no signs of cerebral commotion, but complete aphasia and right-sided hemiplegia, affecting even the face. This gradually disappeared, the wound doing well, except for a large hernia cerebri, which was not fully overcome for about six weeks. At the end of three and a half months the man walked well and could speak intelligently, although incorrectly and with difficulty. The right arm was still paretic.

Routier[3 June 8] relates a case in which a man, aged 36, had the left parietal bone comminuted by a fall, and in a few minutes be-

came unconscious, with right-sided hemiplegia. Trephining was done, and several fragments and some clots were removed. Free bleeding from the meningeal artery was stayed by tamponnement. Five hours after the operation consciousness and motion were restored, and fourteen hours later the man's intelligence was complete; he was, however, aphasic for two days. The subsequent course of the case was favorable.

Somers[147 July] reports the case of a child, aged 4 years and 2 months, who fell 30 feet, striking on his head. He was greatly shocked, but reacted, the right side, however, being paralyzed. The paralysis had disappeared on the third day, but on the fourth epileptiform convulsions ensued, and in the evening trephining was performed. An extensive stellate fracture of the left parietal bone was exposed and a depressed angle of bone was sawed off, when a meningocele occurred, but was reduced. Next day the convulsions re-appeared and the wound was opened and dressed, the membranes being allowed to protrude, after which there were no more convulsions, and recovery was uninterrupted.

Rorer[57 Dec. 28, '89] has recorded a case of peculiar aphasia after a complicated fracture of the left frontal bone. About a tablespoonful of brain-substance, from the second frontal convolution, had come away, and a large piece of the bone, which was driven inward, had been extracted. For four weeks the patient was quite insane. After that he could answer one question correctly, but repeated the same reply to subsequent questions. He would read a few words or numbers right, and then kept on with that last recognized; and the same as to surrounding objects. After about three months this condition passed away, but for some time afterward there was noticeable weakness and slowness of thought and speech. Finally he recovered completely, except that there remained atrophy of the optic nerves, probably from contusion.

A case of punctured fracture is reported by Morse,[77 Mar. 1] in which a man was stabbed with a pen-knife just above the left frontal eminence. Aphasia and right-sided hemiplegia ensued, with pressure symptoms. Upon trephining, the point of the knife was found and a very large subdural clot. Consciousness returned, but the man was very unruly and tore off the dressings. A second clot was removed, but death occurred from exhaustion. An autopsy showed that the knife had penetrated the ventricle, which

was full of blood; there were also inflammatory changes in the brain, although during life there had been no corresponding symptoms.

Three cases of punctured fracture are reported by Girdlestone $^{285}_{\text{Feb.15}}$; in 2 of them trephining was resorted to with success, but in the third the patient refused operation and died of encephalitis.

Reports of other cases of fracture of the skull in adults have been published by Wigmore, $^{6}_{\text{Dec.21,'69}}$ Thomas and Briggs, $^{161}_{\text{Jan.}}$ Lediard, $^{6}_{\text{Jan.4}}$ Orr,[53] Gemans, $^{147}_{\text{Apr.}}$ Logan, $^{12}_{\text{Apr.}}$ Paris, $^{787}_{\text{Apr.}}$ De la Sota, $^{508}_{\text{May 11}}$ Lewis, $^{779}_{\text{May}}$ Bozart, $^{157}_{\text{June}}$ Holmes, $^{74}_{\text{June}}$ Evans, $^{104}_{\text{June14}}$ Wilson $^{157}_{\text{July}}$ (2 cases), Walker, $^{185}_{\text{Aug.}}$ Martinez, $^{1}_{\text{Sept.18}}$ Leishman, $^{86}_{\text{Oct.}}$ Wyman, $^{101}_{\text{Oct.}}$ Estes.[787]

Cases of very severe fracture of the skull in children have been recorded by Little, $^{16}_{\text{Dec.,'69}}$ Curtis, $^{1}_{\text{Dec.21,'69}}$ Barron, $^{22}_{\text{Jan.1}}$ Cameron, $^{89}_{\text{Jan.1}}$ Brockway, $^{764}_{\text{Jan.}}$ Goode $^{267}_{\text{Feb.15}}$ (2 cases), Haslam $^{2}_{\text{Feb.16}}$ (2 cases), Barron, $^{22}_{\text{Mar.26}}$ Richards, $^{59}_{\text{Apr.19}}$ Hunt, $^{112}_{\text{May}}$ Hawkins, $^{105}_{\text{May 15}}$ Takaki $^{200}_{\text{May}}$ (3 cases), Bryce, $^{196}_{\text{July}}$ Hudson, $^{508}_{\text{Aug.}}$ O'Brien, $^{161}_{\text{Oct.}}$ Gordon, $^{2}_{\text{Oct.16}}$ Markley, $^{106}_{\text{Nov.}}$ Manley. $^{9}_{\text{Oct.4}}$

One of Manley's cases demands special notice. The patient, a boy, had a large hæmatoma behind the ear, which was opened and emptied, when linear fractures were detected, with very slight depression. On the sixth day the temperature ran up, and by the eighth other symptoms of grave cerebral disturbance appeared. The wound was opened, and it was proposed to trephine. Chloroform was cautiously given, but the operation had hardly been begun when respiration ceased and alarming asphyxia ensued, the face becoming black and bloated, the brain-tissue, with enormously distended vessels, bulging into the gap in the skull. Respiration was partially restored, but cyanosis continued and the boy died, the pulse beating fully two minutes after the breathing had ceased. No autopsy is mentioned. The author considers this a genuine case of chloroform poisoning; but, surely, cyanosis has not been present in the cases I have myself seen, nor in most of those reported. On the contrary, the awful ashen-gray pallor and the pinched aspect and death-like stillness of the face have often been the symptoms first attracting attention; and the sudden cessation of the pulse has been often noted. Without the knowledge which a post-mortem would have afforded, a positive opinion can hardly be expressed, but I venture to suggest, as more likely, that death resulted from overwhelming of the respiratory centres, perhaps by fresh hæmorrhage by some vessel already damaged; or that a large

mass of clot was carried down to the left side of the heart, and, it may be, into the pulmonary artery, suddenly damming back the current of blood in the veins of the head.

A case is reported by Orr[58] in which a child 18 months old fell about 18 feet, landing on the ground on the left side of her head. The parietal bone was driven in so as to be concave instead of convex. No attempt was made to remedy this condition, which was in time corrected by nature, only a slight flattening being left. I have myself seen such an injury occur to a child in its birth.

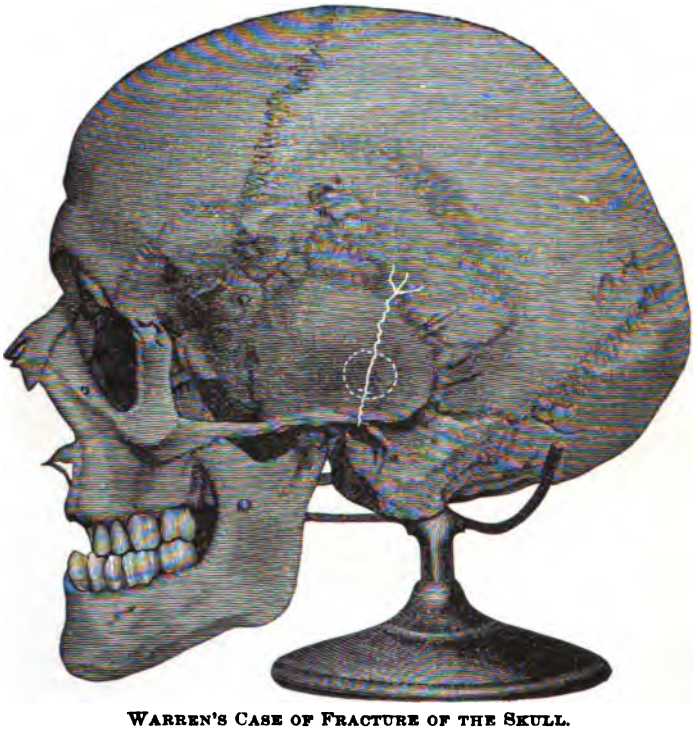
FRACTURES OF THE BASE OF THE SKULL.

A case reported by Warren[5] is worthy of special attention. A young man aged 17 was on horseback, when the animal threw him and fell upon him. He was taken up comatose, and bleeding from the nose and left ear. A narrow strip of brain-substance was upon the sleeve of his coat. Later, two small portions of brain-matter were found, also at the left auditory meatus. Around and above the ear there was boggy swelling, and pressure here caused fresh flow of blood from the canal. About six hours after the accident, trephining was done through a vertical fracture detected in the squamous portion of the temporal bone. The dura was found to be torn, and there was a laceration of the middle lobe of the brain. The fracture was traced along the petrous portion of the bone. Drainage was made by means of a strip of bichloride gauze and some strands of catgut. A strip of gauze was inserted in the auditory canal. The patient remained comatose for a week. There was at first very copious oozing of bloody serum, which steadily diminished, and finally ceased altogether. Care was taken to keep the mouth and pharynx, as well as the nasal passages, surgically clean. His mental condition gradually cleared up, and sensory aphasia, which was at first very marked, disappeared. Hearing was also measurably restored in the left ear.

The course of the fracture is carefully considered; the escape of brain-substance was probably due to the weight of the horse forcing apart the edges of the fracture, which, when relieved, sprang back into place, nipping off a strip of the middle lobe. The value of the drainage established by means of the trephine hole can hardly be overestimated. (See cuts on pages 36 and 37.)

Rorer[57] has reported the case of a man who came under his

care with depressed fracture in the right temporal region, the base being also involved, and marked symptoms of compression being present. Trephining was resorted to, the fragment and clot removed, a vessel tied, and the wound plugged, the dura being left intact. Coma continued for six days. At the first attempts at speech there was, as expected, left facial paresis. In the fifth week there appeared symptoms of athetosis of the left hand, slight flexion movements of the last three fingers; later, also, at several



WARREN'S CASE OF FRACTURE OF THE SKULL.
(*American Journal of the Medical Sciences.*)

times, crampy pronation movements, which gradually disappeared, leaving merely a slight, hardly perceptible tendency to spasm. These phenomena Rorer thought to be due to the existence of extravasated blood passing into a blood-cyst, and possibly foreboding the occurrence of Jacksonian epilepsy. He questioned whether a second operation would not be advisable to prevent this.

Walker[19] reports a case of fracture extending from the vertex to the right ear, and probably involving the base. By means of trephining at three points a quantity of clot and serum was evacu-

ated from beneath the dura and recovery ensued, but with deafness in right ear and paralysis of right side of face.

Another similar case, in a boy aged 15, is recorded by the same author. Coma, with monospasm, opisthotonos, stertor, hand-jerk, and dilatation of right pupil were the main symptoms presented. After trephining at two points about over the middle of the Rolandic fissure there was steady improvement, and in six weeks the boy was well, except that hearing was defective in the right ear.

Norton [22 July 2] has recorded the case of a man, aged 55, who fell 40 feet and was extremely collapsed, bleeding from both ears and

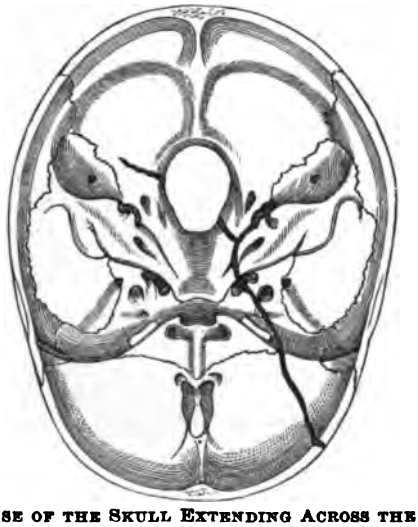
WARREN'S CASE OF FRACTURE OF THE SKULL.
(*American Journal of the Medical Sciences.*)

nostrils, as well as down the back of the pharynx; complete unconsciousness lasted four days, and for over two months the intelligence was imperfect, with delusions; the right arm was at first paralyzed, but gradually regained its strength; tongue drawn to the left when protruded. This was diagnosed to be unmistakably a fracture across the base, and the man's recovery was certainly remarkable.

Pilcher [96 Mar.] reports a case diagnosed as one of fracture of the base in which recovery ensued. In another instance, although trephining of the middle fossa was resorted to on the third day, death ensued from œdema of the lungs.

According to Wyman,[61 Aug. 9] an important sign of fracture of the base is afforded by the "sense-interval;" that is, if a person who has received a head-injury is stunned, recovers consciousness, and then passes again into insensibility, Wyman would regard the diagnosis of fracture of the base as established, and would trephine either of the fossæ at the appropriate point, expecting to find a clot demanding removal. Should this clot be firm and of large size, he employs a scoop made of untempered watch-spring bent into a loop.

It seems to me that the foregoing statement is too sweeping: the sense-interval certainly occurs in other skull-fractures, and the application of the trephine in the basal region "in all cases," and



FRACTURE OF THE BASE OF THE SKULL EXTENDING ACROSS THE FORAMEN MAGNUM.
(*British Medical Journal.*)

"until the clot has been entirely removed," can hardly be safely advised. The scope of surgery in this direction has been greatly widened by recent experience, but there are circumstances under which the hopelessness of interference should stay our hands. It is very unfortunate for the profession when "the operation is perfectly successful, but the patient dies;" and whatever injures the profession is apt to be equally damaging to the public.

A case of fracture of the base by irradiation, the patient having, while drunk, fallen down a flight of fifteen steps, is reported by Monestié.[220 July 18] Death occurred in about twenty-four hours. An autopsy showed diffuse meningeal hæmorrhage and a

fracture which was traced through the three fossæ on the left side in a curved line, the centre of which was about at the body of the sphenoid bone.

In one of Battle's lectures, [2] before referred to, he describes and figures (see cut) a curious specimen of fracture of the base, involving all three fossæ, extending to the edge of the foramen magnum, and starting again on the opposite side. The vibrations must have been conducted around the bony margin, and where they met were sufficiently powerful to cause a fresh fracture.

With regard to the etiology of secondary infections in injuries of the base of the skull, Fraenkel [8] discusses the theories prevalent, viz.: (1) that there is an access of noxious germs at the time of receipt of the wound, which develop themselves after a period of quiescence; (2) that there is an entirely new and superadded element at the time of outbreak of the symptoms. The latter is, in his view, correct; and he adduces clinical and experimental evidence in support of it. Hence, he urges that it should be an inexorable rule of practice, in cases of injury of the base, to bear in mind that germs may be transferred from the nasal cavity to the interior of the skull; and, as a prophylactic measure, to use the utmost care in maintaining the disinfection of the former region.

SHOT WOUNDS OF THE BRAIN.

Szolowjew [696] has sought to solve experimentally the question of the mechanism of the indirect fissures met with in gunshot wounds of the cranium, and believes that the explanation is to be found not in the splitting up of the missile, nor in transmitted vibrations, but in the hydraulic pressure exercised by the cerebral mass upon the walls inclosing it. The parietal and frontal bones and the orbital plates of the latter are most frequently affected in this way; but such fissures are not found when the experiment is made upon the skulls from which the brain-mass has been removed.

Walker [19] reports a case of suicidal pistol-shot wound of the parietal region, the ball lodging in the dura, portions of bone being driven into the substance of the brain. Trephining was done, and the ball and bone-fragments removed; healing was complete in nineteen days.

Mitchell [231] records a case of pistol-shot wound of the right

side of the head (the bullet not entering the cranium), followed by extra-dural abscess, for which trephining was performed through the occipital bone as well as over the motor area. Some curious anæsthetic and hyperæsthetic phenomena were noted; vision was impaired in the right eye, and there was marked left-sided paresis. Three years later the discharges of pus were still abundant.

A case is recorded by Gemans[77 Apr.] in which a man, aged 57, shot himself in the mouth, the bullet ranging upward and lodging just at the left of the median line behind the coronal suture; here there was a stellate fracture, bulging beneath the scalp. An incision was made, the fragments and bullet removed, and a strip of iodoform gauze drawn through the track from the mouth to the scalp for drainage. Death ensued from œdema of the lungs about seventeen hours after the injury.

Among the reported cases of shot wounds of the brain, we find 3 in which, the bullets remaining unremoved, the patients were yet considered as "recovered." Experience would seem to show that, although there may, under such circumstances, be a subsidence of symptoms, trouble is very apt to arise, at a later date, from the presence of a foreign body; and a favorable prognosis cannot be warranted in the face of so menacing a danger.

Porter[99 Apr. 10] gives a case in which the ball, being lodged within the cranium, and with clear evidence of brain damage, non-interference was determined upon (for reasons not stated); the patient was able to leave the hospital on the twenty-fourth day, and seems to have been pronounced recovered. Another instance is recorded by Pilcher.[96 Mar.] A man, 43 years of age, shot himself with a pistol in the right temporal (?) region, "1 inch behind and 3 inches above the external angle of the eye;" the ball passed downward and inward toward the crista galli. Drainage was made for eight days, when, in his delirium, he pulled the tube out, and it was not reintroduced. From this time there was marked improvement, although right-sided facial paralysis, with dilatation of the right pupil, ensued. The man was discharged on the twenty-third day, "recovered." Still another case is reported by Bunts.[222 Nov., '99] A woman aged 28 shot herself with a 22-calibre revolver, the bullet entering at the lower anterior angle of the right parietal bone. Upon trephining there was very free bleeding, only controlled by forcipressure; drainage was made, the ball not having been detected.

Ptosis and dilatation of the right pupil, which had been present, gradually disappeared; at the end of eight weeks the patient was able to sit up, and it is stated that "her recovery had progressed favorably."

In connection with these cases, and as illustrating the fallacy of hopes based upon an early subsidence of symptoms, may be mentioned the following instance, reported by Colquhoun[1000 Jan.]: A young man of 20 shot himself in the temple in 1883; the ball lodged behind the bone near the mid-line in front, fracturing it. He made a good recovery, but was subject to epileptiform attacks, and was unfit for sustained work; was fickle, erotic, and devoid of self-control. In 1887, when he came under the notice of Colquhoun, he was unconscious and had convulsions almost constantly; with a slight intermission, these continued until his death, three days later. At the autopsy a ragged and flattened pistol-bullet was found imbedded in the inner table, where a bony growth marked the seat of an old fracture. The brain and dura mater were here firmly adherent to the skull; damage had been done to several of the convolutions. A somewhat similar case is referred to, recorded by Towle in Pepper's "System of Medicine;" and the experience of many surgeons has been such as to warrant caution in making favorable predictions as to the issue of brain injuries of this kind. And among the cases reported by Battle[2 July 13, '90] is one of a boy, 11 years old, who had his skull penetrated by a small revolver-bullet, 2 inches above and 1½ inches in front of the left auditory meatus. On the third day, double optic neuritis having occurred, he was trephined; the ball was not found. The neuritis gradually disappeared, and so also did a hernia cerebri, which had developed. About four months after the injury he left the hospital, but was re-admitted two weeks later on account of traumatic epilepsy. Discharged again in a little over five weeks, he was under care again with optic neuritis, after the lapse of two months, during which time other symptoms had been noted; he died six weeks afterward, somewhat over nine months from the time of injury. An autopsy disclosed a thick-walled abscess-cavity, and quite apart from it, low down in the right frontal lobe, the bullet, surrounded by apparently healthy white brain-substance; the course by which it had reached this spot could not be traced.

TREPHINING FOR OLD INJURIES OF THE SKULL.

An interesting case is reported by Frank and Church, 5 July in which an unmarried woman, aged 28, became affected with dementia, apparently from a blow on the head received in ascending a stairway. Five years later, there being some flattening (perhaps congenital) of the right parietal surface in front, trephining was done at four points, the buttons of bone and all chips being put at once into warm sterilized water; no disease was discovered, but a large quantity of cerebro-spinal fluid escaped, and the arachnoid and pia were œdematous, their meshes filled with like fluid. The displaced bone was all re-adjusted and the wound closed. Healing took place well, and for nine months there was great improvement; then the condition recurred. A second operation was performed, a portion of the cranial wall, including the former openings, being removed with a Hey saw. Nothing abnormal was found; the bone was not replaced. Healing again went on well, and from the patient's condition at the time of the report the improvement seemed likely to be permanent.

Buchanan 2 Dec. 14, '99 has recorded an instance in which trephining was successfully resorted to for the relief of severe pains in the head which had been more or less continuous for over six years, and which were due to fracture of the occipital bone, with depression, sustained a year or two earlier (the exact period is not stated).

Murdoch 96 Feb. relates the case of a colored man, 24 years of age, who, after falling about 40 feet, was paralyzed in the right arm and leg. Nine months later trephining was performed over the upper part of the Rolandic fissure and a hæmorrhagic cyst evacuated, with complete relief. About six days after the operation he had a temporary attack of right-sided facial spasm, with difficulty of speech; with this exception, his convalescence was uninterrupted. Other cases of successful trephining for injuries of the skull of long standing have been reported by Vaslin, 10 Oct. 11 Cale, 101 Aug. Terrillon. 8 Apr. 20

MISCELLANEOUS.

The absence of visible pulsation in an exposed dura has been observed and reported by Braun 336 Nov. 15 in the case of a boy aged 3 years, who was kicked on the right side of the head and sustained a perforating fracture, a small portion of the bone being detached

and driven entirely within the skull-cavity, resting upon the dura, which was rendered tense. Upon the removal of this fragment, the pulsations, which had previously been but faintly felt with the finger, became at once perceptible to the eye; complete recovery ensued. Braun remarks that, although such observations have been made by others, the phenomenon is not referred to by systematic writers. He also calls attention to the fact that in profound chloroform narcosis no pulsation of the brain can be seen. Otherwise it may be regarded as evidence of some pressure upon the dura, rendering it tense.

Two instances are recorded by Koller[1/Apr.15] in which blows on the anterior margin of the orbit were followed immediately by blindness of the corresponding eye, due to fracture of the optic canal; there may have been also hæmorrhage into the sheath of the optic nerve, as in many cases noted by von Hölder, whose observations on the subject are referred to. In most of the reported instances the sight has been permanently lost, the optic nerve being found to be in a state of white atrophy, as in both of Koller's patients. The matter is, of course, more especially interesting to oculists, but, as the cases are likely to come at first under the care of general surgeons, it concerns the latter also.

In a case reported by Powell,[100/Aug.] a boy 14 years old was sitting on the floor with his back to a wall, during a severe thunderstorm. The house was struck and the boy instantly killed. There was a small, round hole in the plastering just where his occiput had rested. His hair was singed at this point, the neck and spinal region blackened, and there was a small abrasion over the seventh cervical vertebra. The body emitted a cadaveric odor; the face was cyanosed; the abdomen was tense and tympanitic.

Pope[6/Oct.4] gives an account of 5 cases of lightning-stroke, which occurred simultaneously. The men were all standing under a tree; one of them was killed instantly, while all the rest, after a brief period of unconsciousness, recovered.

An instance of severe injury by lightning-stroke, ending in almost complete recovery, is recorded by James.[267] Reference may also be made to a case[41/Oct.6] in which, in a girl 3½ years old, it was questionable whether certain symptoms were due to physical effects of lightning, striking about 10 feet from her, or were the result of psychical commotion.

SURGERY OF THE SPINE.

A valuable contribution to the surgery of the spine has been made by Abbe[59] in a paper containing the histories of 8 cases operated upon by him. The method employed by Abbe for exposing the spinal cord is simple and has great advantages. He makes an incision of the desired length, parallel to the row of spinous processes, ½ inch to one side, cutting down to the bone with one or two strokes; the supra-spinous ligament is then cut across above and below, so as to isolate as many spines as may be desired, the bases of which are then divided with cutting-pliers, and it will be clear that the spinous processes can be turned aside *en masse*, with the soft parts, leaving the vertebral arches exposed; these are next gnawed away with rongeur forceps, and the dura is laid bare.

Three of the cases were fractures in the lower dorsal region of old standing; the conditions found did not admit of relief. One of the patients died thirty hours after the operation, which was undertaken under desperate circumstances, and during which much blood was unavoidably lost.

In one case there was caries of about one-half the body of the twelfth dorsal vertebra, which was treated with benefit by enlarging a sinus in the loin and curetting away all the diseased bone, as well as the walls of the sinus, the cavity being then rendered aseptic.

In two instances extra-dural tumors caused paraplegia and were removed. In one the growth was tuberculous, involving the region of the eighth, ninth, and tenth dorsal vertebræ; complete recovery ensued. In the other it was a round-celled sarcoma at the same part, and there was a history of repeated jars and strains of the back, as well as of long-continued ill health; on the fourth day hiccough and vomiting set in and proved fatal five days later.

The remaining 2 cases were brachial neuralgias of long standing in men about 45 years of age. In both the whole limb was affected; in one, nerve-stretching, amputation high up, and finally intra-dural division of the posterior roots of the sixth, seventh, and eighth cervical nerves gave only temporary relief; in the other the operation concerned the same nerves and the first dorsal as well, which were similarly treated, with rather more marked benefit. It may be noted that in the former of the 2 cases last mentioned, Abbe made a 2½-inch section of the dura, the patient

being entirely conscious and feeling no pain,—a fact contrary to Horsley's statement that that membrane is highly sensitive.

In regard to the amenability of spinal injuries to operation, Bowlby[2 May 17] asserts that the superficial reflexes are of no value in either diagnosis or prognosis. If the deep reflexes are abolished, the presumption is that the spinal cord is crushed or completely severed. After this has occurred, the dislocated bone may be spontaneously restored to its proper position; autopsies have not shown any continued compression of the spinal cord by displaced bone or by other conditions remediable by surgical interference. Chaintre[211 July 6] discusses the indications for surgical interference in cases of injury to the spine, and thinks that statistics speak against it, more particularly in recent cases.

Kraske[41 Apr. 20] has opened the spinal canal in 4 cases of spondylitis. He regards the operation as by no means easy, and as very doubtful in result. Pulsation in the spinal cord is seen as soon as pressure is relieved. He has not had occasion to incise the dura. Such procedures are indicated when the bodies of the vertebræ are not involved in the disease.

A case of injury to the spinal cord in the neck, followed by total paraplegia lasting for several weeks, and then by gradual recovery of motion and sensation, is recorded by Thomas.[267 Dec. '90] There would seem to have been concussion, and subsequent hæmorrhage and myelitis; also fracture of one or more of the vertebral arches. At the time of the report, nine years having elapsed, there were symptoms of commencing secondary degenerations.

An interesting case of luxation in the cervical portion of the spinal column (the precise point is not known) is reported by Acheson.[5 Mar.] The patient, a man 55 years old, was caught under some railway-cars. Reduction was effected by extension and counter-extension. At the time of the report there was still weakness of the neck, some deformity, pain at changes of weather, and an alteration of voice; he "talks down in his throat."

In a case of injury of the neck in a woman aged 36, reported by Decès,[577 Jan.] there was marked flexion forward of the neck, paresis of all the limbs, and prominence of the sixth cervical vertebra, the laminæ being somewhat movable. An incision was made, and the lamina of the left side was cut away with bone forceps. Very decided improvement resulted.

A case of fracture dislocation of the sixth cervical vertebra in a man aged 42, who was caught under a hand-car, is reported by England.[218 Sept.] There was total paralysis of the lower limbs, abdomen, and chest as high as the third ribs. Both arms were paretic. Priapism was constant and seminal emissions frequent. An operation was performed, but without benefit, the patient dying of respiratory failure five days later. The cord was found diffluent at the seat of injury for about an inch, and softened for several inches above and below. A very similar case, in which, however, no operation was performed, and which proved fatal in less than twenty-four hours, is related by Pilcher.[96 Mar.]

A fatal case of fracture of the second dorsal vertebra is reported by Anfimov.[242 Apr.] The patient, a man 34 years old, was run over in the street, sustaining a violent blow between the shoulders. He walked home, but two or three hours later became paraplegic, with loss of control of the bladder and rectum. Sensibility was absent below the second rib; respiration was difficult. Death took place on the fifty-second day, and an autopsy showed oblique fracture of the second dorsal vertebra, with dislocation of the cartilage and hæmorrhage. The spinal cord was reddish and softened in about an inch of its length, and the dura was thickened and hyperæmic.

Dercum[242 Aug.] reports a case in which complete paraplegia, with paralysis of both sphincters and constricting pains in the chest, underwent marked improvement after the spines and arches of the first, second, third, fourth, and fifth dorsal vertebræ had been removed and the dura laid open. The patient was middle-aged, and his history suggested a rheumatic element. The paraplegia was thought to be the result partly of pressure, partly of myelitis.

Wyeth[101 Apr.] reports the case of a boy, 9 years old, affected with paraplegia from compression of the spinal medulla; there was gibbosity of the fourth, fifth, and sixth dorsal spines, for which a plaster-jacket was applied; there was loss of power in the bladder, requiring catheterization, which gave rise to cystitis, and for this supra-pubic cystotomy was done. The laminæ and spines of the vertebræ above mentioned were removed and the dura was found very tense; it was divided and a prominence in the right half of the cord opened, giving exit to a small quantity of creamy pus. Recovery took place well, but the paralysis remained as before.

Two cases of fracture dislocation of the spine at the eighth dorsal vertebra, with recovery, are reported by Browne. [2] One was from indirect violence, and was attended with complete paraplegia; in the other, from direct violence, there was no paralysis. In both a plaster-jacket was applied.

In a case reported by Wheaton, [105] a man aged 24 had motor paraplegia, with prominence of the eighth dorsal spine. Only temporary relief being given by a plaster-jacket, the cord was exposed by operation, the spinous processes and laminæ of the sixth, seventh, eighth, ninth, and tenth dorsal vertebræ being removed. It is not stated that the dura was opened; but the pressure seemed to be in front and out of reach. The patient rallied well for a few hours, but then became collapsed and died. On examination of the cord, a fungous mass was found "between the off-coming motor roots." It is very properly suggested that had careful support been continued, without operation, the cord might possibly have become tolerant of the pressure, and ankylosis might have occurred between the vertebræ, so as to have enabled the patient to live in comparative comfort.

In a case reported by Pilcher, [96] a man aged 35 was buried under a bank of earth and had a fracture at the juncture of the dorsal and lumbar regions; there was total paraplegia, sensory and motor, which gradually ascended; the bladder had to be emptied by catheter, and the urine was bloody. On the sixth and eighth days there were rigors. The spinal column was then opened, and the spines and laminæ of four vertebræ were removed; there was fracture of those of the last dorsal, but no displacement. Extradural hæmorrhage had occurred, and the cord was felt to be soft. Death ensuing thirty-six hours later from asthenia, an autopsy showed the cord softened as high as the seventh dorsal vertebra, and an additional hæmatoma extending from the fifth dorsal to the seventh cervical; the left kidney was lacerated.

From the results of experience at the Klinik in Göttingen, embracing 8 cases (3 of meningocele and 5 of spina bifida), Hildebrand [41] thinks that operative interference is justified when thorough antisepsis can be secured. A similar opinion, based upon results obtained by von Bergmann, is expressed by de Ruyter. [13] Bowen [2] records a case in which, in a newly-born child, rupture of a large spina bifida in the lumbo-sacral region took place. It

was carefully dissected away without antiseptic precautions; a number of nerves emerging from the spinal canal were snipped off closely. Healing by first intention ensued, but at the time of the report the child was becoming hydrocephalic.

Another case, in which the tumor was removed by operation, with subsequent hydrocephalus, is related by Floyd,[227 July] and yet another by Ullmann.[8 July 8]

A curious case is reported by McBurney.[9 May 8] A woman presented herself with a tumor of the buttock, which she ascribed to a blow received seven years previously; it had been removed once, but had recurred. On incision it was found to be cystic, and to communicate with the spinal canal by a wide median foramen in the sacrum. A pedicle the size of a goose-quill was found and tied, and the whole of the cyst was excised. It was clear that this was a spina bifida, of such small size, until accidentally irritated, as to have escaped notice.

Two other instances of unnoticed spina bifida, observed by Klebs and Brunner, are mentioned.[214 Jan. 1] A successful case of operation for spina bifida in a child 2½ months old is recorded by Hoadley.[139 Jan.] Three cases of operation for spina bifida, 2 of which were successful, are reported by Bayer.[336 May 17] He advocates opening the sac at one side, removing degenerated marrow-substance and nerve-filaments entering the sac; if there is a narrow opening into the spinal canal, he closes it by a ligature placed around it. For sutures he prefers catgut.

A case of injury of the cauda equina by a fall on the sacral region, producing permanent motor paralysis of the lower extremities, with a minor degree of anæsthesia, is reported by Zenner.[426 June] Very probably there was hæmorrhage into the canal, causing pressure.

Mention may also be made of an exhaustive article on "*Trépanation Rachidienne*," or resection of the vertebræ (not, strictly speaking, trephining), by Chipault[100 Aug. 2]; of a very practical article on the medico-legal questions connected with injuries of the spine, by Inglis[185 Jan.]; of Watson's paper[61 June 14] on concussion of the spinal cord; and of another article on concussion and compression of the spinal cord, by Carpenter.[856 July]

Reports of cases have been made by Whitten,[202 June 10] Phelps,[426 May] Manley,[59 Sept. 12] and Dalton.[65 Mar.]

SURGERY OF THE NERVES.

Diseases of Nerves and their Treatment.—With regard to the so-called "nerve-nævus," or "ichthyosis linearis neuropathica," only 3 cases of which have been described, Unna[6 Aug. 20] rejects the idea of the disease being connected in any way with the distribution of the cutaneous nerves, but thinks the "lines of fissure" of the embryo afford a clue to its true explanation.

Esch[336 Feb.] discusses the question as to the justification of neurectomy for neuralgia of the fifth pair of nerves, and maintains the affirmative, notwithstanding the fact that in a somewhat large proportion (19 out of 28 which were followed up) the neuralgia recurred. It must be noted that the clinical experience, upon which this thesis was based, included only cases in which the terminal twigs were involved; none in which the trunk of the nerve at the base of the skull was resected.

Lauenstein[69 Jan. 9] speaks highly of Thiersch's method of operating in cases of supra- or infra- orbital neuralgia.

A case of obstinately recurring neuralgia in the trigeminus, in a man aged 62, is reported by Obalinski.[41 Aug. 4] In the course of eight and one-half years five operations were performed, the pain finally disappearing. The only explanation which could be offered was in the existence of anastomoses between the branches of the nerve.

Schott[2 Nov. 22] reports a case of spasm of the right side of the face, occurring without any obvious cause, in a woman. Other treatment failing to give relief, the facial nerve was cut down upon and stretched; for a month or so this seemed effective, but the face was paralyzed; with the return of motion the spasm recurred, and in five months was as bad as ever.

Some interesting instances of reflex nerve-manifestations are reported by Halsted[764 Feb.]: 1. A man aged 33, who had had repeated injuries of the right elbow, in consequence of which there was swelling of the limb, strong flexion of the fingers, and a constant, fine, rhythmical tremor of the hand, affecting the arm also, but in less degree; sensation was subnormal. The ulnar nerve was laid bare for about 4 inches and stretched both upward and downward, after which the symptoms disappeared. 2. A girl (colored) 10 years of age, who two years before had fallen and sustained a small depressed fracture of the left frontal bone; from

that time she had, at intervals of two or three weeks, severe frontal headache at night, with throbbing, tinnitus aurium, and neuralgia of the face, followed next day by an impulse to run away from home. These attacks were always worse in warm weather; noises disturbed her very much. Perfect relief was given by dissecting up a small flap, including the scar, and excising a few filaments of the supra-orbital nerve. 3. A woman aged 36, who had for nine years been subject to intense headaches and tinnitus aurium on the left side; a small hard nodule over the mastoid process was excised, with entire relief. 4. A lady aged 25, who had severe neuralgia of the arm after the removal of a small adeno-fibroma from the breast; this was clearly due to reflex irritation from involvement of some filaments of the long thoracic nerve in the granulations of the healing wound.

Injuries of Nerves and their Treatment.—Two cases of dislocation of the ulnar nerve are reported, one forward, by Parker,[187 July] the other inward, by Annequin[243 June]; both were operated on successfully.

Six cases of suture of divided nerves have been reported and discussed by Etzold.[336 Feb.] In all, the patients were young men, and the injured nerves were strands of the right axillary plexus; the causes, sword-cuts; in all, the artery and vein were wounded and required ligation, during which procedure the nerve-lesions were detected. In one case only was nerve-substance sutured, and in all the rest the sheath. The material used for suture as well as for ligature was sublimate silk. No grave disturbances impeded recovery in any case.

But the results obtained were by no means satisfactory. Only to a limited extent were the functions of the limbs restored, the best case being one in which the median nerve alone was damaged, and a complete bridge of fibrous structure was spared between the divided ends; the disability here was inconsiderable from the first. In another case, where motor nerves only were involved, there was improvement, but only after many months. Etzold gathers from these cases that the regeneration of the nerve-structure goes downward; and hence that the higher the point of injury, the longer the time taken for recovery, and the greater the chance of structural deterioration of the muscles supplied by the nerve involved. Hence the prognosis in wounds of the axillary nerves is unfavorable.

An interesting case is recorded by Reboul[152 Dec.14,'99] in which a girl aged 11 years had, on the front of her right wrist, a transverse cut made by a piece of glass, dividing the tendons of the flexor carpi radialis, palmaris longus, superficial and deep flexors of the fingers, and flexor carpi ulnaris, as well as the median and ulnar nerves and the ulnar artery. The upper ends of the tendons were retracted, and in order to find them the skin and fascia had to be incised upward and turned back. The wound was thoroughly sterilized, and through the ends of each tendon and nerve were passed one or two points of catgut suture; both ends of the ulnar and interosseous artery, and of the artery accompanying the median nerve, were tied; the wrist being then strongly flexed and held so, the ends of the divided tendons and nerves were brought together and the sutures knotted. The usual dressings were then applied and the wrist secured in flexion by a dorsal plaster-splint. Two dressings only were required,—one on the tenth day, the second seventeen days later. For some months the hand had a claw-like appearance, and there was some hyperæsthesia of the ultimate fibres of the ulnar nerve; but these conditions gradually yielded to treatment, one feature of which was the use of continuous voltaic currents through the extensors, and six months after the accident the hand was nearly normal in function as well as in appearance.

A case of shot wound of the musculo-spiral nerve is reported[231 July] in which there was extensor paralysis, with anæsthesia of the dorsum of the hand; the nerve was cut down upon and found to be enlarged and adherent to the periosteum; these attachments were freed and several small pieces of lead were removed, with marked relief to the symptoms. A case of secondary suture of the median nerve and flexor carpi radialis tendon, cut across by a knife eleven months previously, is reported by Carpenter.[112 Jan.] The patient, a boy of 18, came under the care of Ashhurst on account of tenderness and pain at the seat of injury, with loss of motion and sensation in the thumb, index and middle fingers, and loss of sensation in the palm. The skin was glossy and the nails incurvated; there was eczema of the index finger and causalgia along the course of the median nerve above the point of division. The nerve was exposed by a longitudinal incision; a bulbous enlargement of its proximal end was removed, and the two ends were

then freshened, brought together, and the sheath sutured with catgut; the tendon was also sutured and the hand placed in strong flexion upon an anterior splint. For some time there was extreme hyperæsthesia, but very marked improvement had taken place at the date of the report, five weeks after the operation. Electrical tests showed that there were decided qualitative changes in some of the muscles of the hand, as might have been expected from the long time that had elapsed since the injury was received.

The fact that clinical observations as to the changes of sensitiveness presented by the back of the hand, after injuries of the nerves supplying that region, do not correspond with the anatomical descriptions of the ultimate distribution of those nerves, is discussed by Zander.[4 Feb. 24] He has found that there is not, as often stated, a division in the median line between the twigs on the ulnar and radial sides, and that these not only often anastomose freely, but sometimes extend from one side or the other clear across. Thus, the determination of the question as to which of the trunks is involved in a wound may be rendered very difficult; and Zander thinks that a new investigation of the anatomy of the region is to be desired.

A case is reported by Marchant,[61 Apr. 10] in which the anterior crural nerve was compressed by cicatricial tissue formed after a wound by a bull's horn; there was anæsthesia of the parts supplied by the external musculo-cutaneous branch, and the quadriceps muscle was atrophied. By operation the nerve was freed and the symptoms were relieved.

In a case reported by Wyeth,[101 Apr.] a farmer aged 66 received a cut behind the thigh from the blade of a mowing-machine, dividing all the flexor muscles as well as the sciatic nerve just at its bifurcation. Three months afterward there was complete motor paralysis below the knee, and no sensation except in the region supplied by the long saphenous nerve; the sole of the foot was ulcerated at several points. The nerve was laid bare and the bulbous ends cut off, after which the upper and lower portions were brought together and secured by sutures. All the symptoms were relieved.

O'Neill[16 July] reports 2 cases of suture of nerves and tendons in the forearm; in one it was immediate, in the other three weeks after the injury; both were successful. A case of successful

"*suture à distance*" of a divided radial nerve is recorded by Glück.[41] This operation consists in merely joining the ends without drawing them closely together.

Atkinson[2] reported the results in 5 cases of nerve-grafting performed by Robson and Ward and himself. In the first case (operated on by Robson) the continuity of the median nerve at the wrist had been destroyed in the removal of a tumor situated in its substance. Forty-eight hours after its division a portion of human posterior tibial nerve was inserted in the gap between the cut ends and was lightly attached at either end to the divided median nerve by means of catgut sutures. Sensation to touch began to return after thirty-six hours, and by the end of five weeks not only was sensation well restored, but power over the fingers had been regained. The second case was operated upon by Ward. The circumstances of the case were as follow: Following a blow above the inner condyle of the humerus a tumor formed. This was shelled out from the midst of fibres of the median nerve. Four months later the man returned with a fusiform swelling beneath the scar of the former swelling, with anæsthesia, partial or complete, of the area of median supply upon the anterior aspect of the hand, and, to a slight extent, on the back of two fingers, and with wasting of and loss of power in the right forearm. Ward excised the mass with contiguous diseased nerve-structure, and inserted 2½ inches of healthy median nerve removed from an arm that had just been amputated. Upon examination at the end of seventeen months, there was found to be slight sensation to touch, although it was by no means perfect, while there was a fair amount of power in the hand. There was in this case considerable wasting and loss of power, but it is undoubted that the operation of nerve-grafting not only rendered possible the complete removal of the pain-causing, myxomatous mass, but also prevented the total anæsthesia and loss of power that would undoubtedly have occurred had the tumor been left to itself or had the diseased nerve been simply removed without the insertion of the graft. In the third case (performed by Robson) the median and ulnar nerves had been divided above the elbow by a scythe wound seven months prior to the time of his admission. The freshened ends of the ulnar nerve were sutured, while between the divided ends of the median, previously freshened, there was inserted 2 inches of spinal cord from a freshly-

killed rabbit. In six months the patient could pick up small objects and had good sensation over the median distribution, although that of the ulnar nerve was still anæsthetic. The fourth case differed somewhat from the others in that an accidentally excised portion of the sciatic nerve was replaced and united to the main portions. Sensation began to return upon the fifth day and the final result was perfect, except for slight dulling of sensation in the corresponding foot. The fifth case was one of recent accident, by which the ulnar nerve was lacerated, the two ends being found separated by a space of 2 inches.

Atkinson removed the sciatic nerves from a rabbit, and, placing them side by side between the two extremities of the ulnar nerve, united them to the latter. In spite of sloughing and suppuration in the wound, sensation began to return upon the eighteenth day, motion upon the twenty-fifth, the final result being a useful hand with almost complete return of sensation and marked grasping power. These 5 cases alone are a sufficient plea for the further use of this method, the results being certainly better than those obtained without a resort to such a measure. They go far toward proving the fallacy of the doctrine of rapid degeneration of the peripheral portion of divided nerves. In all of these cases sensation returned much earlier than motion in the areas of distribution of the nerves. This delay in return of motion, as compared with sensation, was also illustrated by a case of accidental nerve-section reported by Clark,[213 Pa.] where he united the ends of the median nerve, which had been divided close to the wrist-joint. In this case nerve-suturing was practiced, resulting in a return of sensation in three days, that of motion coming on at the end of a week after operation. On the other hand, Barlow[218 Pa.] reported at the same time an operation for reconstructing the ulnar nerve, divided, eight months before, above the elbow. In this case the bulbous extremities of the nerve were removed and the ends united by catgut sutures. Here, from the report, there would seem to have been no marked difference in the relative periods of time necessary for the restoration of conduction of sensation and volitional impulses.

THORACIC SURGERY.

By J. McFADDEN GASTON, M.D.,
ATLANTA.

PRELIMINARY REVIEW OF PROGRESS.

The former status of this branch being defined, its subsequent progress must now be noted. A review of the advances made during the past year, in the treatment of the affections of the chest, presents many points of special interest. The discussion of medicated injections into the pleural cavity for the purpose of correcting septic processes, and the use of simple washings with water for the entire removal of purulent collections, after operations of paracentesis thoracis, has been continued with very conflicting views of different observers. There is likewise a marked discrepancy in the attitude of operators touching the efficacy of aspiration simply or the continued drainage.aspiration, upon the siphon principle, in purulent pleurisy. The apprehension which has heretofore been manifested in respect to the entrance of air into the chest, upon the withdrawal of a purulent collection, is undergoing some changes from further experience of its effects, and less concern is felt as to it in making single or double incisions for the purpose of drainage. The accidents involving the bronchial tubes from the entrance of foreign bodies into the air-passages have generally been held to warrant operative measures for their removal; but the difficulty of locating such bodies, either by exploration through the trachea or by physical signs observed from without, through auscultation and percussion, has, heretofore, proven a serious barrier to accurate diagnosis as a preliminary step for incisions. A few fortunate results have been reported in the extraction of articles of different forms from the bronchi, affording encouragement to the prosecution of these investigations. Pneumonotomy has been attended with good results recently, but no material progress has been noted in the interesting field of pneumonectomy. Very instructive reports of the partial or com-

plete obliteration of lung-tissue are presented, demonstrating the fact that the thorough decarbonization and oxygenation of the blood may be effected by one lung. Little attention has been given to cases of enchondroma or other osseous degenerations of the walls of the thorax since our last report, yet some interesting operations are detailed in this department of thoracic surgery.

Traumatism of the lungs has a modest place in this review, indicating, however, good results in the treatment. Upon the principle that the last shall be first, the reader's attention is directed at the outset to wounds of the chest.

WOUNDS OF THE THORACIC WALL.

Three cases of pulmonary lesions are reported by W. F. Faison and C. D. Hill at the Jersey City Hospital $\frac{43}{Apr.}$:—

1. Matthew Burke, aged 31, Irishman, was admitted December 6, 1889. In blowing up an old boiler a fragment of iron struck him in the back, inflicting a wound about 1 inch above the inferior angle of the left scapula and 3 inches from the median line of the back. There was both external and internal hæmorrhage, and the patient suffered from dyspnœa, with air passing in and out on inspiration and expiration. On each side of the thorax emphysema was marked. On palpation, percussion, and auscultation, there was evidence of pneumo-hæmothorax. The wound was closed by a thorough antiseptic dressing held in place with adhesive plaster and a roller-bandage. The dyspnœa diminished and the patient's general condition was much more favorable, having a temperature of 101.8° F. (38.8° C.). Two days later the temperature rose to 103° F. (39.5° C.), with complaint of feeling cold, but no distinct rigor. The dressing was allowed to remain, and, with 10-grain (0.65 gramme) doses of sulphate of quinia every three hours, there was a gradual decline of temperature. On the third day the dressing was removed under a constant stream of a solution of bichloride of mercury (1 to 2000) and the opening was completely sealed up. The patient was discharged cured February 13, 1890.

2. George Schaffer, aged 33, an American of good physique, was admitted January 11, 1890, half an hour after being run over by a truck weighing 3500 pounds. Several of the middle ribs were broken on either side, but no external injuries except slight con-

tusions. It required several attendants to hold the patient in bed, notwithstanding the fact that the pulse was almost imperceptible at the wrist, the extremities cold, and the skin bathed in a profuse, clammy perspiration. Emphysema was marked over the whole of one side. No hæmoptysis, but agonizing pain with marked dyspnœa. The lung was probably punctured on one side by the broken ribs. With hypodermics of morphia and whisky the urgent symptoms were relieved, and eight days afterward the patient was sufficiently recovered to be taken home in a coach.

3. Joseph Schum, aged 34, a German of fine physique, was admitted November 1, 1889. The wheel of a large beer-truck had passed obliquely across the left chest and clavicle, grazing the side of the neck. The patient was in profound shock. On examining the chest the whole left side caved in. There was a blood-tumor, as large as an orange, in the axilla. Hæmoptysis, emphysema, and dyspnœa indicated injury of the lung. Stimulants were given, and reaction soon set in. The patient made a rapid recovery, being discharged in twenty-six days entirely well.

In the first of these cases, the wound, being sealed up, was placed in the same external condition as the other two.

PENETRATING WOUNDS OF THE CHEST.

G. F. Inglott,[2] reports a wound of the right lung followed by immediate recovery. G. A., a Maltese laborer, aged 42, of a strong constitution, received, on the night of April 13, 1889, a bayonet-wound in the right side of the back. He complained at once of an acute pain in the chest, and had a bloody expectoration immediately on receiving the wound. He was removed to his home in a state of collapse with pallor. There was an expression of anxiety, sense of stricture and suffocation, accompanied by dyspnœa. Blood was coughed up in mouthfuls, florid in color. There was also some bleeding from the external wound, through which air passed with a hissing sound.

The wound was dressed with carbolic oil, surrounding the chest with a large flannel bandage, using a moderate compression; while perfect rest was enjoined, making the patient lie on the side which was wounded. A sedative mixture was prescribed. At 3 o'clock in the morning he slept, and on awakening all the serious symp-

toms had abated. The cough gradually subsided and the patient recovered completely.

In this case there was prompt occlusion of the external wound, and the favorable results of closure of the opening of the walls of the chest correspond to the experience of the writer in the treatment of penetrating wound of the thorax.

The lesson taught by masterly inactivity, as opposed to meddlesome surgery, in the management of thoracic wounds is thus demonstrated. But, on the other hand, cases have occurred in which a different course of procedure has been attended with a salutary result.

A chest wound, with lung injury, under the care of H. Huybertsz,[174] affords a good illustration of the advantage of drainage. C., aged 22 years, was admitted into the Kalutara Hospital, October 24, 1889, suffering from a punctured wound, inflicted by a knife, just below the right sterno-clavicular articulation. It was directed obliquely from right to left, 1½ inches long, and entering the cavity of the chest. There was escape of air, with a flow of blood, and the patient had a small, feeble pulse and cold extremities. Stimulants with ergot were given and the wound was sutured, leaving a drainage-tube in the opening, and the whole dressed antiseptically. The patient was placed with face downward and absolute rest enjoined. A couple of hours later the dressings were seen to be stained with blood, and upon their removal a stream of blood escaped through the tube. Upon again removing the dressings, two days afterward, they were found to be much blood-stained; temperature, 101° F. (38.3° C.), with easy respiration. The same position was maintained. After the lapse of two days more, the dressing was again removed, showing dry blood-stains; temperature, 101.4° F. (38.5° C.); respiration easy; slight pains in region of wound; sutured part of wound united. On the 30th of October the dressings were unstained, and, there being no discharge, the tube was removed; recovery complete. On the 12th of November he was discharged.

The reporter remarks that, with one single exception, all the cases of chest wounds with lung injury that were admitted into this hospital during 1887, 1888, and 1889 proved fatal from accumulation of hæmorrhage within the thorax. The case of recovery had a knife wound below the inferior angle of the right

scapula, and favorable result was owing to drainage and to the position, which permitted the escape of blood.

Hernia of the Lung.—A case of chest injury with hernia of the lung is also reported by H. Huybertsz [174 Apr.] in which drainage proved advantageous.

Saranaris, a Singalese boy about 12 years old, was admitted into the Kalutara Hospital, on the 9th of November, 1889, for an injury of the chest-wall, by falling on a stake. There was a transverse penetrating wound on the left side of the chest-wall, between the sixth and seventh ribs, through which protruded a piece of the left lung about the size of a closed fist. The prolapsed piece was tightly constricted, purple in color, and cold to the touch. Attempts at simple reduction proved unsuccessful; the wound was enlarged and the piece returned. Some hæmorrhage ensued, but a drainage-tube was inserted, sutures were applied, and patient was made to lie on his left side. Next day the dressings, being much blood-stained, were removed. On the 14th a little purulent discharge soiled the dressing; on the 16th the tube was removed, and on the 29th he was discharged quite well. This result was due largely to the drainage.

At a meeting of the Académie de Médecine, Hache [22 Sept. 8] related the case of a patient aged 20, who, after receiving a knife stab in the dorsal region, was seized with severe dyspnœa, followed in a few days by rigors and fevers. The wound became fistulous, and gave exit to pus. Around the opening percussion was tympanitic. The diagnosis of interlobular pyopneumothorax was made, and without communicating with the bronchi. After having washed the cavity with a solution of biniodide of mercury (1 to 1000), a double elastic drain was applied, through which the antiseptic injections were made. At the end of a fortnight the drain was taken away and the man left the hospital cured. The obliteration of the cavity was effected by the development of the lung, showing the efficacy of drainage.

New Treatment of Pneumothorax.—G. R. Fowler [157 Sept.] refers to a new method of treating pneumothorax, following penetrating wounds of the chest-wall, by O. Witzel, of Bonn. He recommends the following course: A large male rubber catheter is passed into the wound, and the latter firmly sutured about the same, with a point open for the escape of air. The catheter admits into the

cavity of the chest a weak boric solution of the temperature of the body, while the air escapes. After the chest is filled, the air exit is closed and the water siphoned out, removing then the catheter and closing hermetically the opening.

FOREIGN BODIES IN AIR-PASSAGES.

The presence of foreign bodies in the air-passages has attracted considerable attention, and the means employed for their removal are of much practical importance.

An interesting account is given by Theodore Kocher[11 May] of a child 4 years old, who had inspired a little tube of metal. The event was followed by attacks of suffocation, but the patient became better shortly after. The position of the foreign body was found to be in the right bronchus, and tracheotomy was performed. An effort to extract it with forceps and other instruments having failed, the spoon of Leroy d'Etiolles was used with good effect. The body was passed when the movable spoon was flexed and extraction effected. The patient at first became better, but died some weeks after. The post-mortem examination revealed pneumonia and cerebral abscess.

Bátori[22 Mar. 12] exhibited a girl 6 years old who had suffered from a water-melon seed in the respiratory tract. Though inhaled in August, 1889, the child remained well until October, when fever with cough supervened. In the month of February, 1890, pleuro-pneumonia set in with severe pain. The symptoms on percussion and auscultation indicated a point at which the bronchus was closed. The child was seized with a convulsive cough and the seed was ejected, after which it appeared to be improving rapidly.

A unique procedure for the removal of a foreign body was resorted to by Stamm[61 Feb. 15] in the person of a boy about 11 years old. Symptoms of croup on the last of December, 1888, led to the suspicion afterward that a foreign body might have entered the lungs, and some one had seen him eat hickory-nuts shortly before his symptoms of croup set in. On the 10th of January, 1889, tracheotomy was performed. After having failed repeatedly with a bent probe carried down to the bifurcation, the operator pushed the hook down into the right bronchus, where some hard substance was felt. It was lodged so tightly that on withdrawal a small part of the hook broke off, but nevertheless extracted a

piece of hickory-nut shell over ½ inch square. The patient made a good recovery.

The reporter of the foregoing case stated that Smith and Cheadle give statistics of 30 cases of foreign bodies in the bronchi. In 16 cases the substance was lodged in the left and in 14 cases in the right bronchus, thereby upsetting the impression that foreign bodies usually find their way into the right bronchus.

T. Bondesen[678 May] states that a boy of 3 years experienced sudden difficulty in his breathing, and twelve hours later tracheotomy was done without relief; but that subsequently a pharyngeal forceps was used for the extraction of an enlarged carrot-seed from the right bronchus, and recovery was complete.

Success of Tracheotomy.—The successful removal of a hair-pin from the right bronchus, after remaining three months, was effected by F. E. Waxham.[115 Mar.] In the latter part of August, a boy of 10 years drew, by a long and powerful inspiration, a hair-pin, head foremost, into his trachea. Two months after the accident an attack of pneumonia occurred, with bloody expectoration, and the temperature rose to 104° F. (40° C.). He recovered, but a cough continued to annoy him. On December 1st tracheotomy was performed, the patient being under chloroform. Incision was made through three rings of the trachea, and a laryngeal sound detected the needle in the right bronchus. A long pair of slender forceps, slightly curved, being introduced, the needle was grasped, fortunately, near the point and removed at the first attempt, without the slightest difficulty. The patient made a rapid recovery, and within a week the tracheotomy wound had closed, without an untoward symptom.

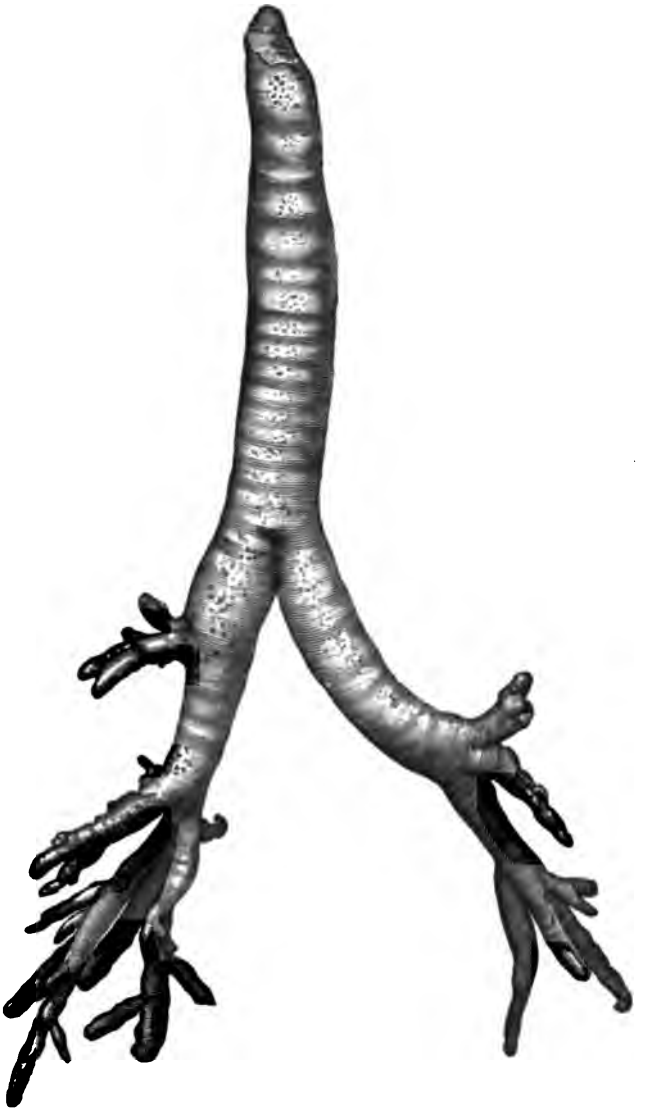
In connection with the above case, M. R. Brown mentions three instances of foreign bodies in the bronchi. One was the case of a girl under 10 years, in which a grain of corn lodged in the bronchus. Tracheotomy was performed and the corn removed, but the child died in a few moments after the operation. The second was also one where a grain of corn had lodged in one of the bronchi. Operation was refused and the patient died within a few weeks. In the third case a cockle-bur entered the right bronchus. The patient, a girl 16 years old, died within two months, without any operation.

Death from a Pea in the Bronchus.—A case of death from im-

paction of a pea in the left bronchus is reported by E. F. Grun.[6] A child aged 2 years had a fit of coughing from swallowing a pea. For a period of four weeks the child continued in fair health, but died suddenly in her cot. At the post-mortem examination a pea, soft and swollen, was found in the trachea at its bifurcation. It had evidently been impacted at the commencement of the left bronchus. Death was believed to be caused by the pea becoming dislodged and occluding the right bronchus. Another death from a pea in the left bronchus is chronicled by Onan B. Gross.[121] Anna McFeely, aged 13 months, was seen August 1, 1889, a week after a most severe and suffocating attack of dyspnœa, which had suddenly subsided, but with recurrence at irregular intervals. Percussion revealed a circumscribed area of dullness extending from the second to the fifth rib, and from near the median line to a point 2 inches below the left anterior axillary fold. The respiratory sounds were also absent in this described area, and surrounding parts of lung-tissue elicited coarse mucous râles of a subcrepitant character. From the twenty-first to the twenty-eighth day of illness a gradual consolidation of left lung occurred, ending in death. On making a post-mortem examination, an average-sized marrow-fat pea was found in the left primary bronchus at its secondary division into the lung-structure, about 1½ inches from the tracheal bifurcation. Of 17 cases, the foreign body has been found only once in the left bronchus, according to the statistics quoted. It was found in the other cases in the larynx, trachea, or, as stated (9), in the right bronchus.

Statistics as to Site of Bodies.—In an elaborate paper by Kocher[8] upon the extraction of foreign bodies from the lungs, valuable statistics of the results are given. The tables of Sander show that in 21 cases of death without operation, and without the expectoration of the foreign body, there were 19 in which an examination was instituted. The foreign body was located ten times in the right bronchus and not a single time in the left. From one of his tables we still learn that, of 16 cases examined in those dying after operations, the foreign body was found four times in the left bronchus or its branches and only twice in the right. In 34 cases where no operation was done the foreign body was found thirteen times in the right bronchus and its branches, being found only five times in the left. The statistics of Beleg show

that, of 30 cases examined, the foreign body was found nineteen times in the left bronchus. Thus it appears that foreign bodies



DIRECT COURSE OF RIGHT BRONCHUS.
(*Wiener klinische Wochenschrift.*)

may become lodged in either bronchus, notwithstanding the greater diameter of the right bronchus, and that it descends nearly in a line with the course of the trachea.

Outlook for Operative Measures.—There is considerable difference in the views of observers as to the propriety of undertaking any operation for the removal of foreign bodies from the air-passages, and most writers concur in refraining from interference when the body has entered the bronchial ramifications. Kocher consigns operative measures to the domain of experiment. He states, in illustration, that West gives the record of 1000 cases in which foreign bodies entered the air-passages. Of 109 cases of seed entering the lungs, 93 per cent. were relieved without operation and only 5 died; while, of 34 cases operated upon, only 76 per cent. were relieved and 23 per cent. died. Of 59 cases where grains of various kinds entered, in 34 without operation 85 per cent. were relieved and 14 per cent. died, while in 25 cases operated upon only 56 per cent. escaped and 44 per cent. died. The expediency of operative measures is thus shown to be very doubtful. In this connection, however, to encourage a resort to surgical measures, the following declaration by W. F. Westmoreland[207 Oct.] may be noted: He has laid down this rule for his guidance, that the certainty of the presence of a foreign body in the air-passages makes an operation immediately necessary, and from this he should make an exception only when the foreign body has descended into one of the divisions of the bronchi.

EFFUSIONS INTO THE PLEURA.

The most frequent result of a disturbance in the normal equilibrium of secretion and absorption on the part of the pleura is serous effusion into its cavity. All are agreed as to the propriety of removing this fluid when medication has failed to bring about its absorption. But the stage at which its evacuation is to be undertaken and the mode in which it is to be accomplished are open questions.

S. Dougan Bird[1000 Jan., '99] urges the early drawing off of the fluid. He states that he has never had to regret early tapping, but several times has bitterly regretted being overpersuaded to delay it. If the fluid is either stationary or increasing, he has not found that pyrexia need be a bar to the removal of the fluid. He holds that the aspirator acts too rapidly and forcibly, and gives the lung no time to expand, and has been known even to burst it and cause pneumothorax. A tolerably firm trochar should be used, and, on with-

drawal of the stylet, a yard or so of small-sized tubing, armed with a nozzle, is at once fitted into the canula. No air can enter, and the pleura gradually drains while the lung expands. The chances of recurrence or purulent degeneration are very small, indeed. The cases of an acrobat and a tradesman, with fluid in the left and right pleura, respectively, illustrate the efficiency of this treatment.

It is urged by Joseph Hoffman,[170 Aug.] upon the authority of Castiaux, Moutard Martin, and Widal, that early puncture in thoracic affections is not followed by evil after-effects, but, on the contrary, the duration of the attack is abridged. He says it has also been conclusively shown that the existence of fever is no contra-indication of the operation. He quotes Formad's post-mortem experience, that pleuritis frequently causes tuberculosis, and that even a moderate effusion after the subsidence of fever is a troublesome and dangerous foreign element. Toussaint's cases are referred to as showing the value of early aspiration in pleurisy:—

4	deaths	in	176	cases	operated	on	between	first and twentieth day.
9	"	"	80	"	"	"	"	twentieth and sixtieth day.
1	"	"	7	"	"	"	"	sixtieth and 120th day.

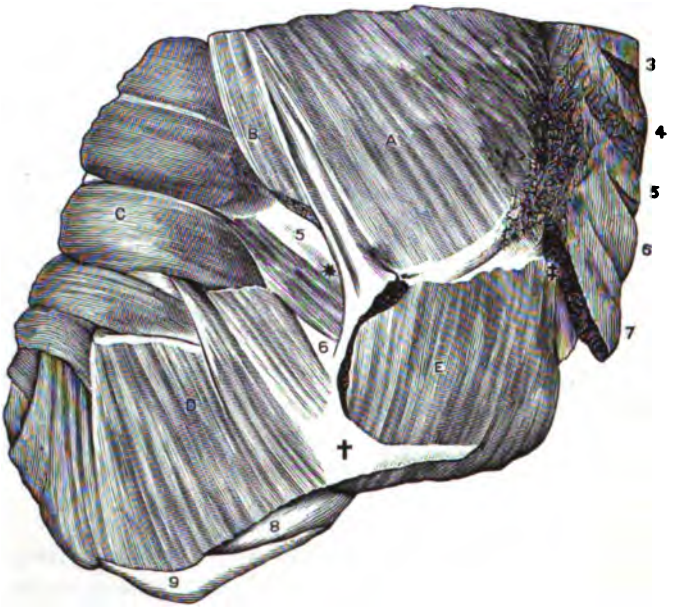
Liebermeister[9 May 10] claims that with removal of the exudate the disease is by no means brought to an end, but, on the contrary, so long as the inflammatory processes in the pleura continue, the effusion will likewise re-accumulate.

Operative Interference.—An urgent indication for operative interference is presented when an extensive effusion seriously interrupts respiration or circulation. Paracentesis may be performed in either of two ways,—the smallest opening for removal of the fluid by aspiration, to be closed immediately, or a large opening in the wall of the thorax, which is kept patent for the purpose of drainage.

Indications to be Met in Empyema.—The consideration of cases of empyema has little practical importance, in view of the fact that the existing state, when complicated with tubercular disease, requires similar treatment. A large experience among observers in different countries indicates the general consensus of the profession as to the measures to be adopted, and it is not requisite to do more than record the main points of the recognized operation in such cases. The indications to be met are well presented in the paper by Bayard Holmes, on the treatment of empyema[231 July]: First, to evacuate the pus; second, to prevent the

production of more purulent matter; and, third, to restore the respiratory apparatus to its normal condition,—thus following Immermann, of Basle. At the German Congress for Internal Medicine, Mosler alone advocated simple incision and drainage. The treatment most favorably received there was Bülan's method, and the subperiosteal excision of a rib and drainage without antiseptic irrigation.

As to the site of the operation, the author claims that Goodlee



LOWER PART OF THORACIC WALLS ON THE RIGHT SIDE.

A, pectoralis major; B, pectoralis minor; C, serratus magnus; D, external oblique; E, rectus abdominis; 3, third costal cartilage; 4, fourth costal cartilage; 5 5, fifth costal cartilage; 6 6, sixth costal cartilage; 7, seventh costal cartilage; 8, eighth costal cartilage; 9, ninth costal cartilage; *, placed just above Mr. Marshall's spot; †, aponeurosis, common to external oblique and pectoralis major and covering rectus; ‡, xiphoid appendix.

alone has put the matter exactly. The retraction of the diaphragm is more rapid than the retraction of the lung, and the opening into the thorax should at least be as high as the centre of the effusion in all cases in which drainage is made against the atmosphere. In case drainage is made into a vacuum, after the manner of Bülan, the locality of the fissure between the lobes of the lung presents some obvious advantages. Holmes thinks that the muscle—free spot of Marshall, as indicated in the accompanying cut—is certainly too far forward. The drainage can be better

accomplished in the axillary line, notwithstanding the amount of muscle and fascia.

Various Operations for Empyema.—The second method of drainage against the full atmospheric pressure is incision, counter-incision, and through and thorough drainage. This method secures better drainage, and gives an opportunity for irrigation without danger of distending the cavity and pressing upon the lung. The method best adapted to those cases that must take care of themselves is the subperiosteal excision of a large portion of a rib and the drainage of the cavity by one or more tubes. When treatment is inadequate to meet the indications, spontaneous discharge of pus may take place through the bronchi, and the cavity formerly filled with pus will come to be occupied with pus and air; or, again, the lung will be pressed back and up, and adhesions occur between the walls of the thorax and the collapsed and shrunken lung. Under such circumstances it may be necessary to excise a sufficient number and extent of ribs to bring the thoracic wall in contact with the collapsed lung by the process of Estländer. In this it is stated that tubercular empyema may follow the perforation into the pleural cavity of a tubercular peripleuritic abscess, originating in a tubercular osteitis of the ribs or vertebræ. This is illustrated in the above wood-cut.

MULTIPLE TUBERCULAR OSTEITIS OPENING INTO THE PLEURA.
(*Cook County Hospital Report.*)

Intra-Mural Abscess.—Riedenger and other authors mention the occasional perforation of an abscess in the thoracic wall into the pleura. Intra-mural abscesses of the soft parts of the thorax should be given an outlet externally so as to prevent their discharge internally. The difficulty in making an early diagnosis of this suppurative process in the thoracic wall, as contradistinguished

from inflammatory developments within the thorax, has most frequently led to erroneous practice in these cases.

A clue to the explanation of an obscure sinus of the chest, reported by Foxwell, [2] is afforded in the probable existence of intra-mural abscess. A girl aged 11 had a daily discharge of 2 drachms (8 grammes) of pus from an opening below and internal to the inferior angle of the left scapula. Five years previously a swelling was noticed over the region of the sinus. This was lanced, but healed and then formed again, and has remained discharging ever since. Six months prior to the report some carious rib was scraped. She was only laid up three months, and improved under simple means.

Incision with Costal Resection.—Simple and aspiration punctures are considered by Schede [2] only as preliminary procedures to avoid a pressing danger. Puncture, with subsequent washing out, as recommended by Bälz, had no better effect. Excellent results could be had by Bülan's method, and in bilateral empyema it was almost indispensable. The most reliable method was from incision with simultaneous resection of ribs. For the site of incision the lowest part of the pleura outside the posterior axillary line was selected, so that in certain cases the tenth, ninth, and eighth ribs had to be resected. It is denied that the expansion of the lungs was necessarily hindered and deformity of the chest produced by the open incision. Schede insists that amyloid degeneration and tuberculosis does not contra-indicate this operation.

Pel, [114] having had in the last eight years about 80 cases in his clinic and 20 cases in private practice, gives the result of his observation in an elaborate paper. His general conclusions are that the pathological indication of empyema is different in different cases, and that the treatment must be conducted strictly according to individual conditions. The radical incision, with resection of ribs, is the only method which assures definite results. Aspiration with irrigation of the pleural cavity is not recommended. Bülan's method is best suited to recent cases. Expectant treatment, without operation, is relied on in cases preceded by a croupous inflammation of the lungs.

Successful Operations for Double Empyema.—Cases of double empyema are of special interest, and a case of recovery after double pleurotomy is given by George R. Westbrook. [1] The

author also refers to the history and treatment of 2 cases of double empyema under the observation of Francis Huber, in both of which the patients recovered.

W. A. Batchelor [9 Oct. 11] reports a successful result in a case of double empyema, with an interval of only five days in the operation of incision and drainage.

A fatal result, following operation for double empyema, is reported by D. S. Hanson. [222 May] Incision and drainage were used in right ninth intercostal space, a little posterior to axillary line, on March 9, 1890, discharging a half-pint of pus. A similar procedure on the left side, ten days subsequently, gave exit to sero-pus tinged with blood in much larger quantity than that from the right. The patient, a young man 19 years of age, grew worse, and on March 27th the great and increasing dyspnœa led to the washing out of the cavities with creolin, 1 to 600, and closure of the openings with iodoform gauze and adhesive plaster, so that no air could enter. He died April 5th.

An interesting case of double empyema, under the care of John H. Morgan, [6 July 19] resulted favorably. Resection of rib was done on each side with an interval of twelve days, followed by the use of drainage-tubes for a month, when the sinus closed, with a perfect cure.

Valvular Tube for Drainage.—A case of empyema treated by the valvular tube, reported by William Williams, [187 July] affords some evidence of progress. It will be remembered that a description of this process was given in the ANNUAL of 1890, vol. iii, p. B–21, the instrument being devised by the above author. William Irvine, aged 7, was admitted to the Royal Southern Hospital March 24, 1890, after being ill for nine weeks. Examination showed a state of great dyspnœa, venous countenance, unable to attempt turning on the right side; left chest enlarged, motionless, uniformly dull, and exhibiting a fluctuating tumor under the left pectoralis major muscle, evidently formed by pus having burst through the intercostals and become subcutaneous at this point; heart displaced and visibly beating beyond the right sternal margin. Temperature, 101° F. (38.3° C.).

A trocar was introduced below and behind in the usual position, and, the valvular tube being applied, 16 ounces (500 grammes) of thick pus came away. On the 26th the temperature was sub-

normal. Two ounces of pus escaped from the tube. The discharge gradually diminished, and on April 8th the tube was found coiled behind the shield and the opening into the chest completely closed. Chest-measurement—left, 11½ inches; right, 12½ inches. The child well and gaining flesh. The valvular tube brought about a cure in fourteen days, with expansion of the lung and limited contraction of the chest-wall, which, being drawn in so quickly, will expand again, so as to make the sides equal.

Use and Abuse of Pleural Injections.—Different observers on the treatment of purulent pleurisy by injections vary widely. Fernet[8 May 27] reports to the Société Médicale des Hôpitaux his treatment of a case of pleurisy by puncture and the removal of 200 grammes (6½ ounces) of pus, after which 15 grammes (3¾ drachms) of Van Swieten's liquid was injected. At the eighth *séance* more than 200 grammes (6½ ounces) of pus was removed, and, the failure of the injections having been demonstrated, recourse was had to naphthol, which might remain longer in the cavity. The solution of Bouchard, 5 grammes (1¼ drachms); alcohol, 33 grammes (1¼ ounces); and water, 62 grammes (2 ounces), was used. Fifteen to 20 grammes (3¾ drachms to 5 drachms) of this solution were thrown into the cavity with each injection. After five treatments the pus disappeared and the patient was convalescent.

The remarks of Mary Putnam Jacobi[9 Feb. 10] upon irrigation in empyema are calculated to inspire caution. She states that thousands of irrigations have been practiced which only serve to keep up the irritation they were intended to allay. This is especially the case with carbolic-acid irrigation of either 1, 2, or 3 per cent.

Levasheff, of Kasan,[59 Sept. 6] presented before the Section of Internal Medicine of the Tenth International Congress, August 5, 1890, a novel view of intra-pleural injection. He recommended the withdrawal of a certain amount of the intra-pleural exudate and replacing it at once with an equal quantity of a solution of chloride of sodium. After this operation had been repeated from two to six times the pleural cavity would contain nothing but an indifferent salt solution, which would be rapidly absorbed.

Fuerbringer, of Berlin, thought that the speaker's experience only showed how much an inflamed pleura could stand in the way of trauma. He believed a simple puncture was all-sufficient

in such cases, and it was needless to complicate it with injections of salt solution or any other fluid.

Fernet [26 July 1] read an essay before the Medical Society of the Hospitals in Paris on the treatment of empyema by antiseptic injections. He has obtained the best results with a solution of naphthol in alcohol and water. The proportions are given above.

H. B. Bowditch [234 Dec., '90] says that it is superfluous to wash out the pleural cavity, and that he only found it necessary once in 399 operations upon 250 patients. He regards it as a serious and dangerous procedure; but J. F. Groner says that when a wound or abscess is offensive nothing is so useful as an antiseptic injection.

General Considerations.—While those with a limited sphere of work in the graver class of cases have claimed satisfactory results in treating empyema by thorough drainage without the resection of ribs, others have found that after these means have failed a resort to Estländer's operation has succeeded. When the lung has become materially diminished in size, or totally unfitted for the function of respiration by contraction and adhesions, it is evident that the walls of the thorax on the corresponding side should be proportionally reduced, and the only practicable mode of effecting this is to remove portions of the ribs. A point of much consequence in connection with the restoration of the respiratory function to the disabled lung without risk of injury to its structure, in aspiration and valve drainage, when no air enters to replace the fluid, is the gradual or partial evacuation of the purulent contents. An enfeebled and contracted lung cannot expand suddenly to fill up the space occupied by an extrusive collection of pus, and, to avoid any risk to its tissues, the discharge should not be completed at one time, but in two or more evacuations.

The process of scraping the serous lining of the chest to improve the vitality of the surface and the transplanting of the skin to cover the exposed pleura are now recognized measures.

Among the valuable contributions upon empyema which have been presented during the year, we will mention the following for reference by those who may wish to investigate this subject in detail. The records of important cases, with well-elaborated views upon the operative measures, are presented by Catrin, [211 Jan. 10] Rabot, [211 Mar. 2] Wotruba, [113 Dec. 8, '90] Barbier, [55 Jan. 11] Blazejewski, [4 June 22] W. O. Roberts, [224 July 5] Amat, [243 June] Hagenbach, [366 July 21] Immermann, [3 Apr. 23] Josef Winter, [87 Apr. 10]

G. Bülan, [114] Carl Schmidt, [4] Davezac, [188] William Pepper, [220] W. E. Tschernow, [366] K. Foltanek, [366] Ernst Kirchoff, [116] James A. Goggans, [40] and M. W. Cave. [801] Besides these, a number of others have published isolated cases with observations, showing the increased attention given to the subject.

ABSCESS OF THE LUNG.

The records of abscess in the parenchymatous structure of the lung, and other disorders calling for operative measures, are entitled to careful attention, whether attended with a favorable result or not, and hence the facts are given.

An interesting case is presented by Turner Anderson. [224] On February 28th the patient, a well-developed, muscular man, 32 years of age, had a severe chill while employed in stove-molding. His temperature was 104° F. (40° C.), and pulse 120 beats. Upon auscultation, crepitant râles over the lower part of the lung were found, and on the following day pneumonia was developed on the left side. On March 9th he had a cold stage, followed by a temperature of 104° F. (40° C.), and sweated very profusely. On the 10th his breath became fetid, and he expectorated very foul, bloody, muco-purulent matter, with shreddy particles. A long aspirator-needle was introduced in the sixth intercostal space, 1 inch behind the axillary line, and drew off a syringeful of pus. Two hours later, 3 pints of fetid, purulent material was removed by aspiration; on the second day afterward an incision, 2 inches long, was made over the seventh intercostal space, 1 inch back of the axillary line, and a large-sized trocar, 5 inches long, was introduced into the lung. But blood only escaped, which induced him to insert the trocar in a more backward and upward direction, when more than a pint (500 grammes) of pus was drawn off. The opening was dilated with the long catch-forceps, and a fenestrated rubber tube, ¼ inch in diameter and 6 inches long, was passed into the lung, which kept the cavity drained. Upon inspiration and expiration, air passed through the tube with a loud noise.

On the next day, March 13th, the patient still expectorated fetid pus and blood, but in much diminished quantity. The cavity of the abscess was washed out with a weak solution of carbolized warm water, some of it passing into the trachea, exciting paroxysms of coughing, while the larger portion of the injection returned

through the tube. The cavity was washed out twice daily at first, and subsequently only once in twenty-four hours. On the 28th the injection was discontinued and the tube shortened. On the 9th of May the tube, which had been shortened to 3 inches, was removed, and the opening closed two days later. His recovery was complete.

The happy issue of this case is notable, in view of the mortality in pneumonotomy being 50 per cent. of the cases heretofore reported.

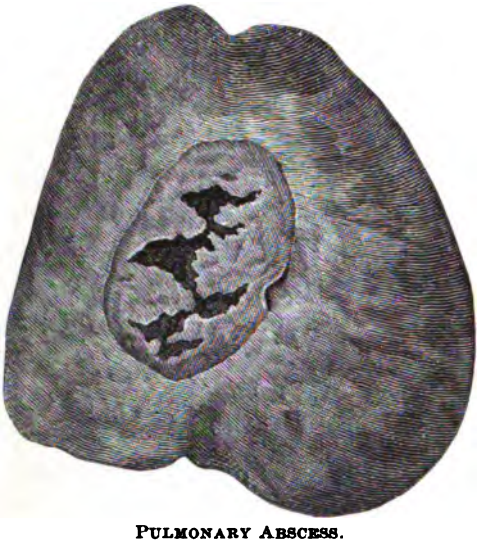
Pneumonotomy.—Four cases, reported by A. C. L. Ramsay, [25 Mar.] illustrate the results of pneumonotomy. In the first case, which was one of the right lung, consequent on pneumonia, a little more than 1 inch of the seventh rib was excised in the axillary line, and the pulmonary cavity was then opened and drained. The cavity closed rapidly, and the patient was discharged at the end of six weeks, and when last heard from was working, in perfect health.

The second was a case of abscess of the lung with pyopneumothorax, due to gunshot wound, in which the patient made a good recovery after excisions of portions of the third, fourth, fifth, sixth, and seventh ribs. In the third case no good effect followed pneumonotomy performed for multiple abscess, following measles, in a subject of tuberculous family, and afterward the patient died from septicæmia. The fourth case presents an abscess of the lower lobe of the right lung, following typhoid fever, and was very successfully treated by pneumonotomy, preceded by excisions of portions of the third, fourth, and fifth ribs in the axillary line.

Fatal Case of Abscess.—A case of abscess of the lung under the care of H. A. Lediard [6 May 18] presents points of interest. In this case the operation of pneumonotomy was performed for the relief of a tubercular cavity in the lung. The cavity was localized, the lung-tissue condensed, the pleura thickened and adherent over it.

The patient, aged 52 years, was admitted to the Cumberland Infirmary April 1, 1889, complaining of cough, with expectoration, of six weeks' duration; over the front of the left lung, toward the base, some median crepitation can be heard; behind, over both lungs, many coarse crepitations and rhonchi. Temperature inclined to rise at night. June 5th: The amount of expectoration is less and still of a muco-purulent character. June 25th: A small aspirator-needle was put into the chest through the fifth intercostal space in the anterior

axillary line, and 1 ounce (32 grammes) of thin pus drawn after the needle penetrated about an inch through a tough and thickened wall. June 29th: He was advised to have the abscess opened and drained, but refused. July 30th: He made up his mind to allow the operation. He has lost flesh and looks haggard. The cough is worse when he lies on his left side, and is always more severe at night. August 14th: An incision parallel with the ribs was made in the fifth intercostal space at the anterior axillary line. The space not being sufficient, a small piece of the sixth rib was excised, and a gush of pus mixed with air followed the introduction of a director. A finger introduced into the cavity showed that it was bounded by calcareous masses. The cavity was syringed out with boracic lotion, causing only slight coughing. A short drainage-tube of glass was inserted and a moss drainage applied. 15th: A very considerable quantity of this purulent discharge, mixed with calcareous particles. Temperature subnormal. 16th: Temperature, 101.4° F. (38.4° C.); pulse, 144; respiration, 40. 18th: The temperature keeps up, without improvement in other respects. Stimulants given freely. 19th: He became rapidly worse and died.



PULMONARY ABSCESS.
(*Lancet.*)

Necropsy showed that the left lung was closely adherent to the chest-wall everywhere. On tearing it away, an oval cavity, about the size of a goose-egg, was found on its axillary surface. The external wall was composed partly of lung-tissue and partly of thickened pleura; internally, it was lined by plates of friable calcareous matter, forming a loose shell. No air-passage opening could be seen.

Success of Resection and Drainage.—An interesting report by D. Maclean $\frac{9}{\text{Sept. 13}}$ presents a case of suppuration, with destruction of

the entire left lung, treated by resection of ribs and drainage of cavity.

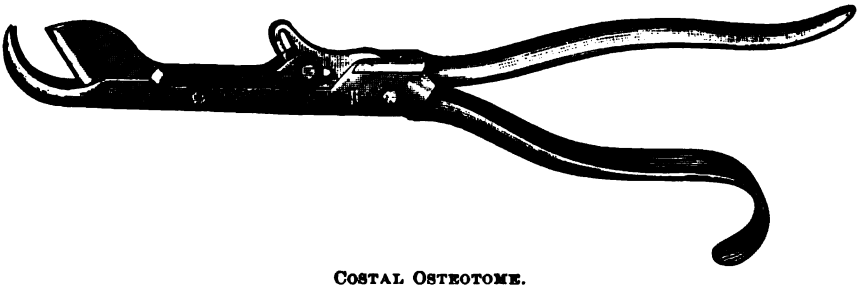
The cavity was tapped and thoroughly drained by the excision of a portion of two ribs, the ninth and tenth, at the lowest point of the abscess-cavity of the lungs. Through this opening an immense quantity of horribly offensive pus was evacuated; the cavity was thoroughly douched with hot water, and a large drainage-tube was inserted, through which daily ablutions with boric-acid solution and other medicaments were effected. The quantity of the discharge rapidly diminished and its quality improved. The child's health was entirely restored.

In addition to the case already referred to and reported by Turner Anderson, this observer $_{\text{Aug.16,Sept.13}}^{224}$ presents another patient (a man aged 22 years) who had all the symptoms of pneumo-pyo-thorax. He was first seen May 29, 1890, with his left side bulging so as to produce great deformity and extensive anasarca. An incision was made over the seventh intercostal space, discharging a large quantity of pus, after which a drainage-tube was introduced. The tube soon failed to let out the pus, though the patient expectorated a large amount of matter. The seventh rib was resected, and a new tube inserted, which went, apparently, 6 inches into the lung. The case had gone uninterruptedly toward recovery up to August 9, 1890, and a cure was thought to be assured in a brief period.

A New Costal Osteotome.—A case of drainage of pulmonary cavity, with the description of a rib-cutter, by C. Denison, $_{\text{Mar.16}}^{6}$ may be added in further illustration of this topic. A teacher aged 26 presented well-marked symptoms of excavation near the surface of the left lung, in the lower axillary spaces. On January 22, 1889, the sixth and seventh ribs were resected and a cavity was entered, which discharged about 4 ounces (128 grammes) of pus. A rubber tube was introduced, which was 4½ inches long, and through this tube an ounce (32 grammes) or more of a 5-per-cent. solution of salol in liquid vaseline was injected twice a day, which was afterward increased to a 10-per-cent. solution. March 16th: The cavity is apparently the size of half an orange, and surrounded with a a fibrous deposit. The tube shortened an inch; does not cough, and expectoration has ceased; washes out cavity once a day, and injects salol and vaseline; the discharge continually decreasing. April 20th: Discharged about 1 ounce (32 grammes) each

twenty-four hours. May 10th: Injects the 10-per-cent. solution of salol once a day; discharge is muco-purulent and inodorous; no discomfort from the tube in left side, and the distance from the axilla to the inner side of cavity is about 4 inches; general improvement. May 25th: Writes that discharges have decreased one-fourth, and the cool, clear air of Salida makes him feel vigorous and strong, and thinks he will be well during the summer. A rib-cutter was devised for this operation, which was first made by H. Rauchfuss, of Denver, and afterward perfected. The accompanying cut shows the improved instrument.

It combines a bone-forceps with a periosteum-separator, and by the toggle-joint, which crowds the knife down upon the latter, gives the operator power enough to make a clean, square section of the rib, without wrenching or injuring the adjacent parts;



COSTAL OSTEOTOME.
(*Journal American Medical Association.*)

when one section is made the periosteum-separator, turned a little so that its edge will bear against the inner surface of the rib, can be crowded along the bone so as to free it from all attachment, and the second section made as desired; or this freeing process may be accomplished before any section whatever of the rib is made. Then one or more other ribs may be treated in the same way. The cavity may then be entered at a selected point by thrusting a blunt-pointed instrument through the pleura and the lung periphery, the opening to be enlarged with the finger, and the drainage-tube inserted. In the case above cited the two pleural surfaces were supposed to be adherent, or the pulmonary connected with the pleural membrane. The external opening of the tube, immediately after its insertion, was stopped by absorbent cotton and vaseline, and oozing only allowed when expiration or a cough took place. The injections with salol and vaseline were commenced on the next day.

DISORDERS OF THORACIC WALL.

Enchondroma.—An instructive report of enchondroma of the rib is given by F. Marsh. $\frac{2}{\text{June 14}}$ A delicate-looking woman, aged 20, noticed two years ago a lump on the chest just above the right breast. It was hard but not painful. The growth now measures about 3 inches in its long diameter, is irregular oval in shape, slightly lobulated, situated over the bony sternal ends of the third and fourth ribs, and firmly attached to one of them.

Under an anæsthetic the growth was exposed by an oblique incision, the soft tissues were easily separated from it, and the projecting part cut off with a chisel and mallet. It proved to be an enchondroma, hard externally, but of a crumbly consistence internally, attached to the third rib, a portion still being left wedged tightly in the third interspace, pressing the fourth rib downward. On removing this with a gouge, it was seen that the growth expanded beneath the ribs into a mass the size of one's fist. The portion of rib from which the growth originated was cut away, and so thin was the capsule, and so blended with the stretched pleura, that it was necessary to excise the implicated piece, measuring quite 3 by 3 inches. There was now an opening of irregular shape in the chest-wall, and, as each bleeding point had been at once secured, the pale, salmon-colored lung, covered only by visceral pleura, could be distinctly seen. It was observed that the exposed lung moved synchronously with each movement of inspiration and expiration, forward and backward, to and from the anterior chest-wall, rather than upward and downward, through a space of fully 3 inches, so that care was requisite to avoid the lung in suturing the wound. It was impossible to bring the edges of the pleura in contact; so that the soft parts were closed over the opening, leaving a short, good-sized drainage-tube in the lower angle. The temperature for forty-eight hours kept up to 100° F. (37.8° C.), and the percussion notes over the base indicated pneumothorax. Directing the patient to inspire deeply so as to empty the pleural cavity of air, the tube was withdrawn and the wound closed with strapping. The patient was more comfortable after the removal of the tube, and the wound healed by first intention. The slight pneumothorax rapidly disappeared, and on April 23d the percussion sounds had resumed their normal state.

A case of necrosed rib, accompanied with intra-mural abscess, is related by W. Smith.[6 Feb. 1] A gentleman aged 30 years had a severe pain in the right side, attended with pyrexia and general ill health. Pus was detected by hypodermic puncture, and when the abscess was opened about a pint of fetid, sanious pus escaped. The rib was found to be necrosed. Hectic fever supervened and the patient sank at the end of three months. The post-mortem examination disclosed an enormous cavity in the wall of the thorax, fragments of several necrosed ribs from the seventh rib downward projecting externally. Right lung partially adherent; no fluid in either pleural sac. The heart and pericardium were healthy, but the abscess had destroyed the right half of the diaphragm. The abdominal viscera was healthy and there was no diffuse peritonitis.

The relator was deterred from removing the ribs by a doubt as to the seat of the abscess, and by fear that excision of the ribs would give rise to septicæmia.

Resection of Sternum.—In connection with diseases of the ribs, a case of resection of the sternum by Tillmanns[22 May 14] may be noted. A man having empyema had repeated resection of ribs and had lain in bed two and a half years without recovery. The left lung was serviceable, the right quite healthy. Numerous fistulæ were present in the anterior thoracic wall. He removed the whole of this part of the wall, thoroughly curetted the pleuræ, and after some days transplanted the skin onto the lung. Recovery took place without reaction. Tubercle present in the left lung was cured. The man had been following his employment again for two years, and the opening has diminished in size, but still allows the movements of the heart to be seen.

Some observations of interest are made by Renaud[184 Aug. 15] upon a case of tubercular osteitis of the ninth rib. There was a primitive pleurisy, followed by cold abscess of the left thoracic wall, which terminated in the affection of the rib, leading to resection.

The patient was a soldier, 27 years old, and presented a tumor over the ninth rib, at a distance of 10 or 12 centimetres from the vertebral column. On the 23d of December, 1889, an incision gave exit to a large quantity of pus from the soft parts, and a second fluctuating pouch was detected under the periosteum. This was subsequently evacuated and that portion of the rib resected, and on the 14th of May, 1890, his health was good.

SURGERY OF THE ABDOMEN.

By J. EWING MEARS, M.D.

WASHING OUT THE ABDOMINAL CAVITY AFTER ABDOMINAL SECTION.

Malcolm, of London, [6] directs attention to a mode in which washing out the peritoneal cavity may act beneficially, which, he believed, had not been described or had its importance recognized. He refers to the views expressed by him in a former paper [1117] with regard to paralysis of the intestines being a most potent factor as a cause of death after abdominal section, and that the symptoms due to this condition have been confounded with those due to peritonitis. He quotes the opinions of Oldhausen, Verchère, Lawson Tait, and others, confirmatory of his statement. In the paper to which he alludes he also calls attention to the presence of some obstruction combined with paralysis when danger arises. Exposure and manipulation of the bowels has a tendency to weaken the peristaltic energy, and a very slight impediment—such natural obstacles as exist at the anus and the friction of the more solid fæces which accumulate in the colon and rectum—may be the cause of a fatal obstruction. Moreover, obstructive conditions may arise as a direct consequence of operative procedure, owing to the union which may occur between a raw surface and the healthy peritoneal layer of the intestines; hence, after abdominal section, the relations of the coils of intestines to each other and to the abdominal walls should be such that no tendency to obstruction will be induced if adhesions should be formed. In the course of an abdominal section it may be impossible to avoid wounding the parietal or visceral layer of the peritoneum, and, after removal of any considerable length of the intestines from the cavity or in the process of cleansing by sponging, it is quite impossible to avoid disturbance of their normal relations in replacing them. If portions of the bowels thus disturbed remain in their displaced positions and become adherent a fatal obstruction may occur.

Washing out the peritoneal cavity, he believed, afforded an

important means for promoting a natural adjustment of the intestines. If, in completing the process of washing, the abdominal cavity be distended with fluid, the intestines must be floated up toward the highest circle of the cavity, thus facilitating changes in the relative positions of the various coils and straightening out the mesentery, undoing acute twists and throwing it and the bowels into natural folds. If the fluid is then simply permitted to flow out or carefully sucked out of the pelvis by means of a tube the intestines will tend to settle down in a natural position. Adhesions may form when the intestines are in normal position without producing obstruction. It is those only which fix them in unnatural positions which are to be feared as a cause of obstruction.

In conclusion, the observation is recorded that patients who suffer much, after abdominal section, from vomiting caused by the anæsthetic agent used, not infrequently recover more satisfactorily and more promptly than those who are not so affected, and the explanation offered is that the shaking of the abdomen caused by the retching and straining in the efforts at vomiting has a tendency to restore to a natural position the displaced intestines before adhesions form or become firm.

DRAINAGE OF THE PERITONEAL CAVITY.

Pierre Delbet [48] describes the various methods of accomplishing drainage of the peritoneal cavity, discusses the utility of drainage, and states the objections to it. The methods of drainage are classified according to the route selected and the material employed.

Vaginal drainage is useful after operations by the vagina for the removal of the uterus, ovaries, or tubes. Great care must be taken to avoid infection by the vagina. Although the *cul-de-sac* is the most dependent point, fluid in front of the broad ligaments may not be removed.

Abdominal drainage may be accomplished by tubes or by agents which act by capillary attraction. *Tubes* are made of hard and soft rubber, glass, and metal. Experience has shown that this plan of drainage is not successful. If the intra-abdominal pressure is feeble, as it is likely to be after operations, the fluid will not flow out against gravity. If, on the other hand, this pressure is

superior to atmospheric pressure, the coils of the intestines are apt to surround the tube, pressing against it and thus obstructing partially or completely its orifices. At the expiration of forty-eight hours adhesions surround the tubes or they are obstructed by fibrinous coagulations. The siphon and the syringe have been used to overcome these defects. With the use of the first it is difficult, if not impossible, to maintain rigid antisepsis. Experiments have proven that aspiration by means of the syringe cannot be relied upon.

Capillary drainage may be obtained by means of gauze or wicking. These substances may be used in tubes or may be placed free in the cavity. An objection is urged to the use of gauze in this manner, owing to the danger of particles becoming detached, and its meshes may become penetrated by tissue. Mikulicz proposes the following method: A piece of iodoform gauze (20 per cent.) the size of a large handkerchief is taken, to the centre of which a strong piece of aseptic silk thread is stitched, and the piece is immersed before using in a 5-per-cent. phenol solution. When used it is arranged as a pouch, and is carried by means of curved forceps to the bottom of the pelvis and is filled with strips of iodoform gauze, the free end of the silk thread issuing from the mouth of the pouch. When it is desired to remove the drain the silk thread is drawn on. Mikulicz claims the following advantages for this plan: the sac of gauze acts as a tampon, drains the pelvic cavity by means of capillary attraction, keeps the cavity aseptic, and shuts off infection from the peritoneal cavity.

The plan of putting the gauze in tubes combines with it all of the disadvantages of the tubes. These are overcome when, as is sometimes practiced, the tube is placed in the gauze. In the practice of many surgeons, simple strips of gauze are placed in the abdominal cavity, one end at the points to be drained, with the other issuing from the lower angle of the abdominal wound.

The objections to drainage are stated to be that it retards the cure, especially so if the tube is allowed to remain over twenty-four hours; that it favors septic infection; evacuation of serous fluid cannot be depended upon even under aspirating force; the intestines may be wounded and even perforated by the tubes; the use of large tubes has a tendency to promote the development of

hernia; peritonitis, local in character, may be caused by the drain-tubes, and adhesions may be formed, causing pain and intestinal obstruction. To-day the general adoption of antiseptic methods in all operations upon the abdominal cavity has materially influenced the necessity of drainage and limited its use.

CAUSES OF PERITONEAL ADHESIONS AFTER SURGICAL OPERATIONS.

Demboroski, 226 No. 44, '99 with the purpose of ascertaining what mechanical or chemical agents cause peritoneal adhesions, has made a number of experimental observations. From the observations made it was ascertained that the omentum, when sutured to the anterior parietes, became firmly united within three or four days. The intestines never become adherent to the omentum. A small piece of iodoform gauze placed between the liver and anterior parietes was within a week firmly adherent to the parietal peritoneum, and the newly-formed capsule around the gauze was in turn adherent to the thickened visceral peritoneum. Almost all sutures act as foreign bodies and cause firm union of the parietal peritoneum along their line of insertion. Iodoform does not provoke adhesion. Extravasated blood is rapidly absorbed. Antiseptic solutions do not cause union of the peritoneal surface. Wounds of the peritoneum, such as scarifications, are covered over smoothly without adhesions. These results afford very little assistance in the prevention of adhesion after abdominal section. It was found, when it is desirable to create adhesions, as in the fastening of a floating kidney, that the most effective method is to inject a simple solution of celloidin in equal parts of ether and alcohol; the alcohol soon evaporates and celloidin acts as a foreign body, causing rapid and strong peritoneal adhesions.

MESENTERY.

Chylous Cys.—Rasch read before the London Obstetrical Society 6 Nov. 22, '99 a paper in which he reported abdominal section for the removal of a large chylous cyst of the mesentery, occurring in an anæmic girl aged 21. About a month before admission to the hospital the patient lifted a heavy trunk, and a week later was seized with severe abdominal pain. A large, roundish, elastic swelling occupied the middle of the abdomen, extending mostly to the left and 2 inches above the umbilicus. The pelvic organs were

normal. On opening the abdomen, a glossy, pale-pink tumor, formed by the layers of the mesentery and containing a collection of milk-white fluid, was found. After evacuation of 6 pints of fluid the cavity was sponged clean and, with the peritoneal cavity, was washed out with warm boracic-acid lotion. The cut edges of the cyst were sutured to the abdominal incision and the cavity was packed with iodoform gauze. Examination of the fluid, microscopically and chemically, appeared to prove that the fluid was chyle. The milk-white fluid escaped for some time from the cyst-cavity, which gradually closed up. Rasch thought this to be the first case of chyle-cyst in a female, and that it occurred as the result of rupture of a mesenteric lymphatic during exertion. He discussed the difficulty in diagnosis, and stated that mesenteric tumors generally appeared first at the middle line, near the umbilicus, and had free transverse but little vertical mobility.

Tumor.—Terrier presented at the meeting of the Société de Chirurgie, May 16th, $_{\text{May 11}}^{3}$ a large tumor of the mesentery, weighing 25 pounds, which he had removed by laparotomy. During the operation he was compelled to resect the small intestine, owing to firm adhesions which could not be detached, and form an artificial anus. Nine days after the operation the patient died, the cause of death not being ascertained.

DERMOID MESENTERIC CYST.

Sir Spencer Wells $_{\text{June 14}}^{2}$ reports a case of dermoid mesenteric cyst occurring in an umarried girl aged 19, for the removal of which he performed abdominal section. On examination, dullness was found to extend from the lower edge of the liver downward for about 4 inches below the umbilicus. Thence to the pubes there was resonance in the middle line and in both lumbar regions. The cyst could be moved freely from side to side, not at all upward or downward. Vaginal examination showed the pelvic cavity free. Doubtful fluctuation, absence of hydatid fremitus, or any sign of hepatic disease, excluded hydatid disease of the liver, while the history pointed to some congenital tumor of mesentery or omentum. On opening the abdomen, the mesentery appeared in cyst-like form and yellowish white in color. On incision of the cyst, yellowish, semi-solid, fat-like matter escaped, and some bundles of fine hair were removed by the fingers. The cavity, which ex-

tended backward quite down to the spine or root of mesentery, was thoroughly cleansed by fine sponges. Owing to the difficulty of keeping such a large and deep cavity perfectly aseptic, and the doubt as to the return of the contents, it was decided not to drain, but to close the wound, including the edges of the incision in the mesenteric sac with those in the peritoneum. The fatty matter removed weighed 6 pounds. The patient made an excellent recovery, a small umbilical hernia, the size of a large grape, with a pin-hole opening in it, remaining, which it was proposed to close at a subsequent operation.

CYST OF THE OMENTUM.

Accompanying the above report, Sir Spencer Wells also describes a case of omental cyst occurring in a female child, 4 years old, which he removed by laparotomy. The patient was pale, delicate-looking, not well nourished, but not apparently ill; complained of being soon fatigued, and the mother reported an increased swelling of the abdomen. On examination the abdomen was found to be prominent, chiefly below the umbilicus, dull on percussion, and fluctuating. The examination led to the conclusion that a thin-walled cyst existed, which was probably ovarian, and which contained a thin fluid. Aspiration was performed at a later date, removing 3 pints of thin, watery fluid, containing a mere trace of albumen and no hydatids. The cyst refilled slowly, and a year later laparotomy was performed. On opening the abdomen there was no free peritoneal fluid, but a very thin, cyst-like expansion of the omentum was found adherent in the right iliac fossa to the abdominal wall, to the cæcum and appendix cæci. Four pints of fluid of the same character as that removed at the tapping were evacuated. The cyst was separated with difficulty. In the upper portion of the omentum a few small, cyst-like collections of fluid were found and removed after ligature, or pricked and emptied. The abdominal incision was closed and the patient made a prompt recovery. At the expiration of a year no return of the disease had taken place.

RETROPERITONEAL FATTY TUMOR.

Homans[99] reported a successful removal of a retroperitoneal fatty tumor. At the meeting of the Boston Society for Medical Improvement, at which the specimen was presented, Cabot said

that the mesocolon usually formed the anterior capsule of these tumors when very large, and the colon lay across the tumors and could be separated only with great difficulty. Richardson referred to the first case reported by Homans, in which it was almost impossible to remove the enormous tumor which presented. In this case the large intestine was so intimately connected with the growth that a part of its mesentery had to be sacrificed. The case just reported was interesting not only from the brilliant success which followed its removal, but from the severity of the symptoms caused by so small a tumor. It was impossible to make a positive diagnosis, but the violence of the symptoms made a laparotomy imperative. Homans stated that very little information could be gained by palpation of the small tumor. Large fatty tumors fluctuate and resemble ascites very closely.

HYDATID CYST OF THE ABDOMEN OF ENORMOUS SIZE.

Jonathan Hutchinson[806 Apr.] places on record a case of hydatid cyst of the abdomen, the very largest he had ever seen or of which he had read any account. He had seen the case first in the patient when a boy 12 years of age, at which time he had diagnosticated hydatid cyst of the liver and had aspirated, evacuating a pint of perfectly clear fluid, respecting the nature of which there could be no doubt. Twelve years later the patient again came under care, with an enormously distended abdomen. Tapping with a large trocar was first tried without success, and an incision 2 inches in length was made, through which the fluid, with loose hydatid cysts, was ejected with great force; the cysts which escaped filled a large chamber-pail, of all ages and in all conditions,—most of them pellucid and tense and clearly living. After withdrawal of the fluid and cysts a large cavity was left, presenting everywhere a grayish-white granular surface. It was impossible to identify a cyst-wall, and an effort at removing the lining membrane made it evident that the peritoneum was being detached. The intestines were held back in very close compass, close to the spine. It was decided to abandon any effort to remove the parent-cyst, and after repeated washings with water and with weak carbolic-acid solutions the abdomen was closed, three large drainage-tubes having been introduced into the different parts of the cavity. Owing to the fetid character of the discharge it was thought that the drain-

age was defective, and three days after the operation the abdomen was re-opened and washed out three or four times daily. The hand was on several occasions passed into the large cavity to ascertain whether any process of contraction was taking place. At the end of three weeks the cavity showed decided decrease in size and the discharge became much less. Ultimately the wound closed and the patient returned home about three months after the operation. Two years have elapsed and he is in sound health.

In reviewing the case, Hutchinson asks whether it is probable that the hydatids were loose in the abdominal cavity or contained in a thin mother-cyst. If the latter hypothesis is adopted, what became of the cyst during the process of healing? Apparently the healing was by formation of adhesions between the apposed walls of the cavity. There was no evidence, at any time, of exfoliation of parasitic cyst-wall. It is difficult to believe that the interior of a parasitic cyst would have granulated and formed adhesions. To have attempted removal of the hypothetic cyst would have been useless and harmful. Attention is directed, in conclusion, to the recurrence of hydatid tumors after simple tapping, when by such procedure a cure is supposed to have been effected.

PERITONITIS.

The current medical literature for the past year has received numerous contributions upon this subject, especially as relates to the cause and treatment of the tubercular form. At the meeting of the Medical Society of the County of New York, held September 22d, 59 Oct. 1 H. T. Hanks read a paper on the diagnosis and treatment of certain abdominal diseases principally characterized by symptoms of peritonitis. With regard to diagnosis, the author stated that a careful examination of all of the abdominal organs should be made, when symptoms of peritonitis were present, before concluding that it was idiopathic. Although he had, in his experience, met with cases which were idiopathic, he regarded this form as rare. His opinion in this respect was confirmed by Draper, who had informed him that few of the cases which he had once supposed were cases of idiopathic peritonitis were such in fact. In the past the author had based the diagnosis of peritonitis on such symptoms as pain in the abdomen, tympanites, rapid pulse, pinched face, etc., symptoms which to-day it was known might be produced by hepatitis, peri-

hepatitis, metritis, acute congestion of the kidneys, gastritis, etc. When the question of treatment was considered the necessity for accurate diagnosis became evident. Saline purgatives or enemata should be given to keep the bowels open when peritonitis existed or was threatened. Codeia, which was preferable to opium owing to the constipating effects of the latter, should be administered simply to procure comfort. Ice-coil about the abdomen, if the fever was marked; leeches; hot douches in the rectum and vagina, three or four times daily, should be employed. If, under this plan of treatment, the case did not improve, the symptoms gradually growing worse, laparotomy should be performed. The mortality from the operation had been great.

A. Jacobi, in the discussion which followed the reading of the paper, spoke of peritonitis as it occurred in children. Anatomically and pathologically, the disease was the same in infants as in adults. The causes were about the same, except in adults a large number originated from pelvic tumors. Peritonitis, he believed, was secondary in nearly all cases; in many cases the diagnosis was erroneous, and in many more instances its presence was overlooked. Many cases of so-called belly-ache were due to peritonitis, sometimes acute, oftener subacute, but most frequently exacerbations of chronic peritonitis. Adhesions between intestines, when found, meant old peritoneal inflammation. Patients with these adhesions complained, at times, of abdominal pains. Perityphlitis was common in children. Children with abdominal pains due to recurrent attacks of peritonitis should always wear a tight bandage to keep the bowels from jolting. He spoke of the introduction of the opium treatment of peritonitis by Alonzo Clark. Before this laxatives were used, and it was found that patients, as a general thing, did better under the opium treatment. In cases of peritonitis resulting from fæcal impaction, the bowels must be first emptied and rest secured afterward. In view of the good results obtained from both plans of treatment, it was very desirable to ascertain in what cases the one treatment was demanded and in what ones the other, or whether purgatives were indicated in the beginning and rest afterward. He thought, if peritonitis had existed for more than a day and a half, adhesions would have formed and a purgative would cause them to rupture, giving rise to hæmorrhage and renewed inflammation.

Thomson called attention to the frequent presence of purulent peritonitis, found post-mortem in Bright's disease, which had not been suspected during life. A small, rapid, incompressible pulse, the incompressibility differing from that peculiar to the kidney disease itself, always attracted his attention to the existence of this form of peritonitis in the terminal stage of Bright's disease. He believed with Jacobi that peritonitis was a common disease, and in cirrhosis of the liver it was likely to be general, and was oftener the cause of abdominal pains in alcoholics than gastritis or gastro-duodenitis.

C. C. Lee thought salines removed only one of the complications of certain forms of peritonitis, namely, fæcal accumulations and gases. He would begin the treatment with salines and obtain rest by codeine, which he thought to be better than opium. The ice-coil he regarded useful in the formative stage; when plastic deposits had occurred it would do harm. In secondary peritonitis successful treatment depended on removing the cause. It was more a question of when not to operate than when to operate. He thought abdominal sections would not in the future be practiced so often as at the present time.

E. H. Grandin spoke of puerperal peritonitis, which occurred less frequently to-day owing to the almost universal employment of cleanliness. The vagina and uterus should be kept clean. In puerperal peritonitis he began treatment with salines and continued their use, and avoided opium as far as possible. He believed they brought about a derivative effect and prevented adhesions.

R. A. Murray stated that primary peritonitis seldom occurred, and in really severe peritonitis all remedies almost always failed. Treatment of puerperal peritonitis, by either laxatives or opium, was likely to fail, simply for the reason that the cause, infection, was not removed. In peritonitis after operations salines removed serum and the nidus for the development of germs. Follow them by opiates to secure rest. If there was shock, give large doses.

Perforative Peritonitis.—Mikulicz, [336] at the Eighteenth German Surgical Congress, read a paper on the operative treatment of perforative peritonitis. He thinks the results, though brilliant in some instances, are not entirely satisfactory, believing that sometimes operative interference has hastened the patient's death. A study of the pathology of septic peritonitis and a recognition of

its different forms will, he believes, enable us to distinguish those cases which are favorable for operation from those incapable of relief. He describes two types: 1. A diffuse septic peritonitis, due to immediate infection of a large peritoneal surface. Rapid development, acute or *foudroyant;* thin, sanguino-serous or purulent, putrid, thin fluid, varying in amount; a thin fibrinous deposit; no firm or extensive adhesions. 2. Acute or subacute form; at first localized to immediate vicinity of perforation. Exudation fibro-purulent, which shuts off the infected from the intact peritoneum by adhesions. The limits of the process steadily extend, continuously separating the inflamed from the healthy peritoneum, encapsulating between the agglutinated viscera pus in greater or less amounts. This form he designates "progressive fibro-purulent peritonitis."

In the first variety—a diffuse, septic peritonitis—he opens the peritoneal cavity freely, finds and closes the perforation, disinfects, as far as possible, the whole peritoneal surface.

In the second form—progressive fibro-purulent peritonitis—this method of operation is contra-indicated. Here the adhesions should not be disturbed, and each intra-peritoneal abscess should be evacuated separately in order to prevent fresh infection from the freed contents of these encapsulated foci of purulent exudation. In 1 case six intra-peritoneal abscesses were evacuated through these incisions at four successive operations. The diagnostic indications of such abscesses are increased resistance, tenderness, dullness, and elevated temperature. In cases of doubt an exploratory puncture should be made. The abdominal wall should be divided by a free incision where this abscess is most prominent, the cavities washed out and packed with iodoform gauze, and not closed by suture.

Hawkins-Ambler, and Lawford Knaggs $_{\text{Apr.19}}^{2}$ report a successful result following laparotomy for the relief of acute, diffuse suppurative peritonitis, occurring in a boy aged 9, who presented symptoms of intestinal obstruction, upon which peritonitis supervened. On the second day after the onset of urgent symptoms the abdomen was opened and the intestines were found agglutinated. The obstruction was found to be due to a kink in the small intestine, which was adherent to the bottom of Douglas's pouch. In separating the adhesions with the finger an abscess-cavity was opened and a

quantity of very fetid pus escaped. A glass drainage-tube was passed into the right lumbar region and several ounces of non-fetid pus were ejected with great force. A drainage-tube was placed in Douglas's pouch and the wound was closed without any effort having been made to wash out the abscess-cavities. At the end of two weeks a large, flat, doughy tumor developed in the vicinity of the umbilicus, accompanied by very grave constitutional symptoms. These symptoms disappeared simultaneously with the discharge of a considerable quantity of offensive pus from the drainage-tube, and convalescence progressed without interruption. In five weeks the sinus closed, and ten months after the operation the patient was in robust health. Attention having been directed to the fact that the abdomen was not washed out, it was explained that the operation was performed under exceptional difficulties in the country, with only dirty tank-water available and without apparatus for washing out the cavity. It is quite evident that any extended efforts at washing out the peritoneal cavity in this case would have resulted in breaking up the adhesions which isolated the abscess-cavities and caused general infection, which would have, in all probability, resulted fatally.

Tuberculous Peritonitis.—König read a paper before the Surgical Section at the Tenth International Medical Congress, Aug. 2, on the treatment of tuberculous peritonitis. He stated that the disease occurred almost exclusively in women and children; out of 137 cases collected by him only 16 had occurred in men. In all there was great abdominal distension, by reason of the fluid present, and in most considerable emaciation; tumors could be felt, on palpation, in some. There was no doubt as to their tubercular nature. He had proved it by examination of some of the tuberculous masses which he had been able, in one or two instances, to scrape out. In one case he had excised a piece of omentum, and in it were abundant tubercle bacilli. His treatment consisted in abdominal incision and washing out, as far as possible, any tuberculous masses which were loose or could be easily loosened, with water sterilized by boiling. Of his 14 cases 7 remain well now, 3 had died from causes unconnected with the operation, 1 from collapse caused by the operation, and 3 had been lost sight of. The subsequent history of all cases reported showed that the cure was at least fairly permanent. He referred to the patient of Sir

Spencer Wells, who was well twenty-five years after the operation. He had ascertained that of cases recently reported 17 were alive one year after operation, 30 two years after, and 14 three years after. At present the source of infection was not determined. In a majority of cases, he believed, it depended on intestinal tuberculous lesions, and certainly, in a number of cases, the lungs were the source of infection. He could not offer any definite explanation as to the *rationale* of flushing the peritoneum. The removal of the fluid and the consequent starving of the tubercle might explain the curative effects.

Czerny[25] has published his opinions on the results of surgical intervention in cases of tuberculosis of the peritoneum and of viscera inclosed within this membrane. Tubercular peritonitis is regarded as being, in the majority of instances, a secondary affection, occurring as a result of infection from the pleura, from the intestinal canal, the mesenteric glands, or the genito-urinary organs. In cases of tuberculosis of these organs, he thinks, the surgeon should endeavor to remove by operation the local affection before it has had time to develop peritonitis. The surgical treatment of intestinal and mesenteric tuberculosis has not, up to this time, had any very successful results, as the diagnosis is very difficult. The previous history and family history of the patient will assist in the determination of the tubercular nature of an attack of peritonitis. A distinction should be made, when the surgical treatment is considered, between the variety of the affection which is characterized by the presence of fluid exudation and miliary tubercles and that in which it presents itself in the form of dry and adhesive peritonitis, in which large and tumor-like nodules of tubercular material are present. In the former surgical interference has, in some cases, been followed by good results. In the latter the prospects of affording relief are much less favorable and they have been seldom submitted to surgical operation. The author is inclined to believe the dry form of peritonitis to be an advanced stage of the ascitic form, and that it is developed after the absorption of the fluid effusion. While clinical experience demonstrates that abdominal section and removal of the fluid in the first form should be preferred to medicinal or expectant method of treatment, the study of collected cases induces him to believe the ultimate results of such treatment not very encouraging. The

operation in itself may be free from much immediate risk, but surgical interference may favor indirectly the advance of the tuberculosis. Most of the recorded cases have been published too prematurely, and it is thought, if the subsequent progress of the cases treated had been followed up, the results would not have been regarded as satisfactory.

Spaeth[69] attributes the unsuccessful results of laparotomy in cases of supposed tubercular peritonitis to errors in diagnosis, and considers the demonstration of the presence of bacilli a very important distinction. Of 4 cases reported by him the bacilli were found in all. One died, five days after operation, from collapse; 1 from acute phthisis three months after operation; 1 from intestinal tuberculosis, and 1 was dying at the time of the report from the same affection. He believes that laparotomy in primary tuberculous peritonitis is curative, but this affection is extremely rare. Satisfactory results are not obtained by operative measures when the female genital tract is involved, and they are only palliative in peritonitis due to tubercular enteritis.

From the character of the opinions expressed in the numerous contributions made to the current medical literature upon the subject of the treatments of peritonitis and the diseases given in the discussions which have occurred, it is apparent that the question is still *sub judice*, and that no well-defined principles of treatment have been enunciated. The simplest method of dealing with the subject, it appears to me, would be that which would base the treatment upon the stage of inflammation present, efforts being made, of course, to remove the cause, if a cause is ascertained to be present. In the first stage of inflammation, according to this view, the treatment would be essentially medical in character, and would consist in the employment of remedies for the purpose of accomplishing depletion, general and local blood-letting, purgatives, especially the saline purgatives, with opiates to relieve pain. In the exudative stage absorbents are indicated; local applications of mercurial preparations, with the internal administration of small doses of the mild chloride, with belladonna and opium; in the stage of resolution, supportive treatment. If suppuration supervenes, the abdomen should be opened, washed out with disinfectant solution, and drained. This is the plan of treatment which would fulfill all of the indications presented in the

ordinary or so-called idiopathic form of peritonitis. In the septic form, no matter what the source or cause of the infection, immediate laparotomy is indicated for the purpose of removing and treating promptly the cause, and of dealing summarily and effectually with the conditions following its application. Irrigation and drainage in these cases, as suggested and practiced by Mikulicz (page 10), are essential parts of the treatment. In suppurative peritonitis, arising from any cause whatever, the abdominal cavity should be regarded as a large abscess-cavity, and should be treated, as these would be treated occurring in any part of the body, by incision, disinfectant irrigation, and drainage; but as, without question, a great number of errors in diagnosis occur, our efforts should be directed to perfection in the methods of diagnosis. To perform laparotomy in the first or second stage of the so-called idiopathic peritonitis is as manifestly injudicious and harmful as it is to fail to perform this operation in a case of septic or suppurative peritonitis. We should endeavor to so increase our knowledge as to enable us, by early recognition of the condition, to combat successfully the progress of ordinary inflammation to the stage of suppuration, or to remove or correct the cause in septic conditions, so as to limit the extent of the invasion.

With regard to tuberculous peritonitis, sufficient experience has been obtained in its treatment to permit the formation of somewhat definite conclusions as to the curative effects of operative procedures. Czerny makes two varieties,—the ascitic variety, with miliary tubercle, and the dry and adhesive form, in which large and tumor-like nodules of tubercular material are present. In the former, which is the ordinary form submitted to surgical treatment, it is urged that the successful results claimed have been premature, and the careful study of the recorded cases shows this claim to be well founded. Selecting those cases operated upon in which an examination of removed tissue has revealed the presence of the tubercle bacilli, and thus made the diagnosis positive, operative measures have not proven to be permanently curative, death occurring from tuberculosis at later periods in most, if not in all, instances. Removal of the fluid, which is an excellent culture-ground for the bacilli, appears to retard the progress of the affection. In primary tuberculous peritonitis, which is admitted to be extremely rare, the removal of the fluid may, as it has been

suggested, act by starving the tubercle, and thus effect curative results. Many cases, without question, of reported cures of tuberculous peritonitis by laparotomy, have been published prematurely, or the diagnosis has not been made positive by the examination of and the detection of the presence of tubercle bacilli.

STOMACH AND INTESTINAL TRACT.

Gastrostomy.—G. W. Gay [99 Sept.] records a case of gastrostomy performed upon a patient about 50 years of age, who complained of his inability to swallow anything but liquid, of which he could take but small sips at a time. He felt no sharp pain; merely a sense of pressure; had lost 30 pounds in weight, and was in a pitiable condition. On exploration with the œsophageal bougie, only the next to the smallest size could be passed through the stricture, which was located behind the sternal notch. The glands of the neck were somewhat enlarged. Partial relief only was obtained by feeding through the tube, and a radical operation was decided upon. This was performed by an incision 4 inches long, an inch and a half below the border of the ribs on the left side, beginning about 2 inches to the left of the ensiform cartilage. The peritoneum was divided to the extent of 1½ inches, and the stomach, which was collapsed and lying 5 inches from the wound, was drawn into it and placed under easy control by means of two wire loops, about ¾ inch apart, passing through the outer coat of the organ. Silk sutures were then employed to secure the stomach to the edges of the wound, the peritoneal surfaces being carefully apposed. A puncture, about ¼ inch in size, was made by a tenotomy knife, and a small glass tube was introduced, which was connected with the feeding-apparatus, a small glass funnel, by a rubber tube 2 feet in length. Decided relief was immediately experienced by the operation until eight days after, when he was seized with severe pain in the epigastrium, due probably to separation of adhesions about the wound. Fifteen days after the operation some difficulty was encountered in introducing the tube into the fistula, and the liquid caused pain, indicating that, probably, it did not enter the stomach, but some adventitious cavity, which the autopsy proved to be the fact. Rectal feeding was substituted for three days for that by the fistula. At this time the stomach became irritable and rejected the food soon after it was

introduced. Twenty-six days after operation the patient died from exhaustion. Autopsy revealed chronic pulmonary tuberculosis; cancer of the œsophagus; acute diffuse peritonitis; senile atrophy of the kidneys; chronic pleurisy; cloudy swelling of the kidneys and liver. The external wound communicated with the stomach, and also with an adventitious cavity between the stomach, spleen, and surrounding tissues, into which food had evidently entered. About half a pint of whitish, opaque fluid was found in the peritoneal cavity. A rough, elevated, nodulated growth, having an irregular outline in one place, fully an inch thick, occupied the entire circumference of the œsophagus for 2 inches above the sternal notch.

In the discussion of the paper of Gay, which was read before the Suffolk District Medical Society, Warren referred to the great difficulties he had experienced, in a case in which he had performed gastrostomy, to overcome the tendency to leakage from the fistula, an account of which is given in the ANNUAL for 1889. Having suffered in this respect, he had turned to other methods of relief in cases which came under his care subsequently. In these cases he employed œsophageal tubes, adapted for intubation of the œsophagus. These consist of a number of short tubes, about 6 inches in length, with a funnel-shaped opening; to one edge of the funnel a long thread and an ordinary œsophageal tube or whalebone with ivory points, which can be inserted into this cup-shaped funnel. By means of a string the tube will be held firmly against the end of the whalebone, and can be passed down as an ordinary œsophageal tube into the œsophagus and engaged in the stricture. When it has passed through the stricture, the flange resting upon the upper border, the whalebone can be disengaged and withdrawn, the string remaining, coming out of the mouth and being tied around the ear for the purpose of removing the tube when necessary to clean it. In 3 cases of stricture of the œsophagus, 1 carcinomatous and 2 cicatricial, due to the ingestion of caustic potash, the method commended itself. In the carcinomatous case it worked very satisfactorily. The patient experienced great relief and gained in weight at first. Afterward, a certain amount of trouble occurred in its management. Retching, vomiting, and coughing followed its withdrawal and replacement sometimes. Wearing it a considerable time dilated the stricture so that he could

dispense with its use for a time. The patient ceased reporting at the hospital and, probably, soon after died. In 1 of the 2 cases of cicatricial strictures the tube became so firmly impacted in the stricture that it could not be withdrawn, and the string was cut and it was abandoned. After two or three months it passed through the intestinal canal without producing unpleasant symptoms. The experience of Warren in these cases led him to commend a thorough trial of the plan of intubation.

Richardson believed that in impermeable strictures, which are occasionally met with, the method of intubation could not be employed. He discussed the question as to the advisability of operating in these cases with a view to prolong life. He thought that in many cases the discomforts which followed the operation were greater than if the patient had been allowed to die without operation. In other cases he had seen patients die with the suffering which necessarily attends malignant diseases, in comparison with which the discomforts of opening the stomach are very slight.

H. C. Dalton [663 Oct.] records a case of carcinoma of the œsophagus in which he performed gastrostomy, the patient living in comfort four months after the operation. Owing to the condition of the patient it was deemed inadvisable to employ an anæsthetic agent, and an attempt was made to operate under cocaine anæsthesia, a 5-per-cent. solution being used. A vertical incision, 2 inches long, 3 inches above the umbilicus, and 2 inches to the left of the median line, was made with a view to reach the cardiac extremity of the stomach. After incision of the skin the pain was so great that ether anæsthesia was substituted and the operation was hurriedly completed, the patient being in a critical condition. The anterior wall of the stomach, as near to the cardia as possible, was sutured to the peritoneum, and no attempt was made to open the stomach until the day following. At that time an opening one-half of an inch in length was made and peptonized milk and whisky were given through a rubber tube. The tube was sutured to the edge of the abdominal incision and corked. For a period of ten days he remained in bed and was given peptonized milk and whisky every three hours, with a soft-boiled egg three times daily. After getting up he was fed on bread and meat, these having been first moistened before introduction into the stomach. The stomach was washed out daily, after which 15 grains (1

gramme) of benzoate of soda with one drop of carbolic acid were administered. At the end of fourteen weeks, vomiting, diarrhœa, and rapid emaciation developed, resulting in death two weeks later. Autopsy showed a carcinomatous growth of the œsophagus the size of the closed fist, situated on a level with the fourth dorsal vertebra. Stenosis of the œsophagus was complete.

Hahn[336 Oct.2] has published a paper giving an account of an improved method of gastrostomy which he has practiced in 8 cases. The operation differs principally from former operations in that the site selected for the formation of the gastric fistula is in the eighth intercostal space. The technique of the operation is as follows: The primary incision (5 to 6 centimetres long) is made parallel to the left costal arch, and distant from it 1 centimetre. The peritoneal cavity is opened to the same extent and the eighth intercostal space is sought, being easily found through its relation to the seventh costal cartilage, which is attached to the base of the xiphoid process. A second incision is now made in the eighth intercostal space, beginning close to the junction of the eighth with the ninth costal cartilage, and extending outward and downward. The parietal peritoneum, when exposed, is punctured with a pair of compression forceps and the wound dilated to the extent of the incision by opening the blades. Then, through the first opening the left thumb and index finger are introduced, and direct the blades of the forceps to that portion of the stomach nearest the fundus. This portion is grasped by the forceps and dragged out through the intercostal wound until the stomach-wall protrudes 1 centimetre beyond the skin, when it is fastened by sutures approximating the serous surfaces of stomach and wound, the abdominal incision being previously covered with antiseptic gauze. The opening of the stomach can be made immediately or in a few days, when the peritoneal surfaces are united. Dissections have shown that the diaphragm is not wounded by the oblique incision outward and downward in the eighth intercostal space. The advantages claimed for the method of operating are: a small, contracted stomach is more easily reached, and is secured with less tension; the wound is better protected from the contents of the stomach and, therefore, heals more rapidly; leakage around the feeding-tube while *in situ* is obviated by the compression exerted by the cartilages of the ribs; subsequent dilatation of the gastric fistula

is prevented by the action of the cartilages of the ribs, and no obturator is required.

Gastrotomy.—M. H. Richardson [99 Aug. 21] reports a successful case of gastrotomy for removal of foreign bodies. The patient, a lady 30 years of age, swallowed, on three successive days, a gold pencil-case, a large open safety-pin, a steel crochet-needle 5 inches in length, and several common pins. The safety-pin, the patient stated, stuck in her throat and she pushed it down with the crochet-needle. When first seen by Richardson she was very comfortable; there was no constitutional disturbance, and on physical examination nothing could be detected. Three days later, after removal of the patient to the hospital, the temperature rose to 103° F. (39.46° C.) and there was considerable discomfort and pain. The day following, gastrotomy was performed, the abdominal cavity being opened in the median line, between the ensiform cartilage and the umbilicus, by an incision 4 inches long. The pyloric end of the stomach was seized and drawn out of the abdominal wound. As this was done the sharp point of the open safety-pin was felt sticking into and through the posterior wall of the stomach, just above the pylorus. This was removed through a longitudinal incision, ½ inch in length, in the anterior wall of the stomach 2 inches from the pylorus. A careful exploration of the stomach, the duodenum and the intestines, as far down as the ileo-cæcal valve, was made without the discovery of the crochet-needle and other foreign bodies ingested. The temporary suture of the opening through which the pin had been extracted was found after the exploration to be in such good shape and to hold so well that it was allowed to remain. Nothing had been taken by the patient twelve hours preceding the operation, and nothing escaped when the stomach was opened. The patient recovered well from the operation and the sutures were removed at the end of the seventh day. Eleven days after the ingestion of the gold pencil-case, and seven after the operation, it was passed per anum. Ten days subsequently one of the common pins was passed. Nine days after the operation there was an elevation of temperature, and a slightly fetid discharge was noticed on the dressing. On exploration of the wound, at least a pint and a half of foul pus, with distinctly fæcal odor, was evacuated. Examination with the probe revealed a localized peritonitis, the contents being infected in some way,

probably by perforation of the lower part of the curve of the duodenum by the crochet-needle. The needle was not found. Under careful irrigation the abscess rapidly healed. With the exception of a feeling of discomfort about the epigastrium, which the patient called dyspepsia, she has been in the best of health and spirits since leaving the hospital. The most interesting point in connection with the case is the disappearance of the crochet-needle and its ability to pass through the intestine.

In discussing the paper, Bradford related a case of a child brought to a physician with the point of an ordinary shawl-pin, which had been swallowed, protruding through the wall of the abdomen. Being requested by the mother to remove the pin, the physician was at first at a loss to know how to proceed; finally, he pulled the pin out firmly, and, with a pair of bone-pliers, cut it off. Two days later the head was passed per anum.

Perier[22, May 7] related an interesting case of a man who had, during temporary mental aberration, ingested a teaspoon. Eighteen days later he was admitted to the hospital suffering from great pain. Great pain was experienced on pressure over the region of the stomach, but the foreign body could not be felt owing to the very thick abdominal wall. In order to ascertain definitely the presence of the spoon in the stomach, the electric exploring instrument was introduced, and at once the bell began to ring, announcing contact with a metal. The stomach having been washed out with Vichy water, gastrotomy was performed, the spoon extracted, the wound closed in the stomach and abdominal wall by sutures, and the latter dressed with salol. Two months subsequently the patient left the hospital well.

Resections of the Stomach—Pylorectomy.—V. Eiselsberg records[226, pp. 785, 844] 19 cases of stomach resection in Professor Billroth's clinic from March, 1885, to October, 1889, with the following results: typical resection for carcinoma (sarcoma), 10 cases with 4 recoveries; atypical resection for carcinoma, 1 case fatal; circular resection for cicatrix, 5 cases with 3 recoveries; partial resection for cicatrix, 3 cases with 1 recovery,—19 cases with 8 recoveries. Of the 19 cases 17 were women and 2 men; the ages of the patients varied from 26 to 58. In almost all of the cases there were symptoms of stenosis of the pylorus; the trouble was pronounced from six months to a year. In all cases but 1 no cause could be assigned.

The most prominent symptoms were pain, feeling of distension after food; later, impossibility of taking solid food; vomiting of blood seldom observed. In 13 cases of carcinoma hydrochloric acid was found in 6 and not detected in 7 cases. In 4 cases of cicatricial stenosis, hydrochloric acid was found in all and in 2 in large amount; all patients were much emaciated. In almost all cases a distinct tumor could be outlined on palpation; the examination for this purpose could be more accurately made under chloroform narcosis than with gaseous distension of the stomach; dilatation was present in almost all of the cases to a considerable extent. Operative procedures were indicated: 1. In cases in which stenosis and a palpable tumor existed. 2. Where well-marked stenosis existed without tumors. 3. An exploratory incision was made in cases in which a tumor, apparently non-adherent, could be detected, although stenosis was not marked. 4. In large tumors, with or without stenosis, especially where patient's condition contra-indicated, no operation was performed. In the last year there were 8 cases of this character.

For operation, the patients were prepared by a thorough washing out of the stomach with warm water for several days, during which time no solid food was given. During this period nutritive enemata and laxatives were administered. The abdominal incision was made in the median line, from ensiform cartilage to about the umbilicus, prolonged below if necessary. The finger is introduced through the lesser omentum and passed along the lesser curvature, detecting in this way adhesions to the liver, metastases in this organ, enlargement of the mesenteric glands, and especially adhesions to the pancreas. The thermo-cautery is used to free the portion of the stomach to be resected and iodoform gauze is placed under it. The duodenum is occluded by a strand of iodoform wick and the stomach with Rydygier's clamp, or, better, by the hands of an assistant; the section begins at the lesser curvature. The occlusive stomach suture is double, usually of the mucous membrane, and sero-muscular. As soon as this suture is completed the tumor is removed and the gastro-duodenal suture is made, employing for this boiled carbolized silk by the Wölfler method. The abdominal wound is closed in the usual manner, and a few hours after operation enemata of warmed wine or milk, peptonized, are administered and continued at inter-

vals of three to four hours for the next ten days. Cold boiled milk with brandy was given by the mouth on the day following the operation and solid food after the sixth day. In three weeks the patient got out of bed. Of the 10 fatal cases, perforative peritonitis was the cause of death in 7. The defect in suture, permitting escape of contents, was found anteriorly in 3, at the junction of the occlusion and gastro-duodenal suture in 2, below in 1, and in the occlusive suture in 1; in the 3 remaining fatal cases 1 was very anæmic, 1 in which the patient did not rally the vena colica had been ligatured, and in the third there were hæmorrhages from the pancreas. Of the 4 patients who were operated upon for carcinoma, 1 lived a year, 1 eighteen months, 1 seven months, and 1 was living at time of the report. Of the 4 cases recovered after operation for cicatrix, 1 died in three and a half months, apparently from recurrence of the stenosis, the patient being the subject of carcinoma, although no trace of the disease was found in the cicatricial portion of pylorus removed. Three were alive and well at the time of report. Total number of stomach resections performed in Billroth's clinic, 37: for carcinoma, 26, with 11 recoveries; for cicatrices, 11, with 5 recoveries. Of the 11 carcinomatous cases, 2 died in four months, 1 in 5 months, 1 in eight, 1 in ten, 2 in one year, 1 in one and a half years, 1 in two and a half years, and 1 in five and a half years. One was living at the time of report, nine months after operation. Of the 5 recoveries from operation for cicatrices, 1 died in three and a half months, 1 in five years, and 3 are living.

Czerny [69 Nov. 7, '90] gives the results in his operations of resections of the stomach as follows: eight pylorectomies for carcinoma in 7 patients (two operations in one case, on account of recurrence) gave 3 deaths, all from gangrene of the colon; two *elliptical excisions*, one for cicatricial stenosis and one for alveolar sarcoma, resulted in cure; of three pylorectomies for cicatricial (non-malignant) stenosis, 1 died from failure of the suture,—thirteen resections in 12 cases, 8 recoveries with 4 deaths. In the malignant cases the patients lived, after operations, from five months to two years, the symptoms, after recurrence, being precisely the same as in the primary disease. In 12 cases, up to the year 1885, he closed the incisions, owing to adhesions or metastases, which rendered an operation impracticable. He has made fourteen explora-

tory incisions,—thirteen for carcinoma and once for expected adhesions of the stomach. Of these cases, but 1 terminated fatally,—when he attempted to isolate a tumor. He concludes that exploratory operations are not dangerous.

Schmitt [336 Apr. 5] suggests, in order to test the competency of the sutures after stomach resections, the pumping of air into the stomach through a tube until it is distended, and making gentle compression while the organ is being distended. If the sutures are deficient the air will escape, and the slightest insufficiency may be detected. After the test has been made the air is permitted to escape through the tube. The method can do no harm, and takes but little time.

William Stokes [2 May 3] read a paper before the Medical Society of London on pylorectomy, detailing a case upon which he had operated, with fatal result eleven and a half hours after operation. He referred to the fact that the initial operation was undertaken by Péan eleven years before, and also to the occasional successes obtained on the Continent by Billroth, Wölfler, Czerny, and others. He regarded the subject as one of great importance, in view of the undoubted steady increase, of late years, in the number of cases of carcinoma among the community at large,—a fact strongly emphasized by Spencer Wells,—and also that the pylorus is so favorite a *habitat* for abdominal cancer. Gussenbauer and von Winiwarter [755 p. 372, 76] show that 60 per cent. of the cases of cancer of the stomach are situated at its pyloric extremity. Butlin points out, in his work on the operative surgery of malignant disease, that carcinoma of the pylorus in many instances is limited to that part, and does not involve neighboring organs by adhesions, or is complicated by glandular infiltration. In the case operated upon, the symptoms were given in detail, and the diagnosis made was "dilated stomach, resulting from probably a cancerous pyloric obstruction." On the day previous to the operation, the stomach was washed out thoroughly with a 5-per-cent. solution of boracic acid, also on the day of the operation. The abdomen was opened by a curved, oblique incision, about 4 inches in length, on the right side, a little above the level of a horizontal line drawn across the abdomen, corresponding to the umbilicus. The occlusive sutures of the stomach, ten in number, were applied by Czerny-Lembert method,—with small, round, straight needles, armed with fine,

carbolized, twisted-silk sutures. The gastro-duodenal sutures were introduced in two sets,—one through the mucous coats and the second through the serous and muscular coats. During the operation the patient became quite weak, requiring active stimulation with brandy. After being placed in bed the condition improved. Later, a sudden failure in the heart's action occurred, and the patient died eleven and a half hours after operation. In reviewing the operation in this case, William Stokes refers to the fact that it was the fifth performed in Great Britain, all having terminated fatally in from four to fourteen hours. The sixth and last case reported,—that of Mr. Rawdon's,—in which Senn's decalcified bone apposition plates were employed in effecting the gastro-duodenal junction, had resulted successfully. This success he attributed to the small size of the pyloric tumor, the absence of adhesions and of extreme emaciation, the short duration of serious symptoms, and to the sutures employed (Senn's approximation plates), which shortened materially the time occupied in performing the operation, thereby avoiding the dangers from shock and collapse. As to the question whether, owing to the unfavorable statistics and the speedy recurrence, in some instances, of the disease, pylorectomy can ever be regarded as a legitimate procedure, he thought that increasing surgical experience tended to strengthen the efforts of surgeons in the operative treatment of carcinomatous affections. His own extended experience led him not only to adopt this view, but to the adoption of views in favor of the primarily local origin of the disease. He thought, also, we should not abandon as hopeless the possibility of a discovery being made in the future of a constitutional therapeusis which may exercise a modifying and possibly destructive influence on the growth and extension of carcinoma. He quoted Virchow's view as to the possibility of its being a local affection, not only at its beginning, but often very long afterward, when "it must be possible, during this period, locally to cure it."

The discussion which followed the reading of the paper was participated in by Messrs. Knowsley Thornton, Bryant, Jessett, Pearce Gould, Gilbert Smith, Barker, and Sir William McCormac. Thornton doubted the ability of the surgeon to obtain perfect asepsis in these operations, also whether the mere duration of the operation was to be credited with any great effect in

determining the mortality. He did not believe that women had greater ability than men to support abdominal operations, and he pointed out that malignant disease within the peritoneal cavity was characterized by a disposition to early diffusion, and this fact must militate necessarily against the ultimate success of the operation.

Sir William MacCormac agreed with the author of the paper as to the value of an exploratory incision in order to arrive at an early diagnosis. He thought if any progress was to be hoped for it would certainly be in that direction. He believed that mere duration of the operation influenced the mortality. Bryant thought, with the author, the question resolved itself into three, namely, of diagnosis, as to the period of the operation, and, lastly, as to the operation itself. He believed pylorectomy, under certain circumstances, to be a perfectly legitimate operation, and that the use of Senn's plates was the proper method of performance. Gould believed that the operation could find but a small place in surgery, and pointed out that there were no symptoms in the early stage of malignant disease of the pylorus, and that when obstructive symptoms occurred the disease had advanced to such a stage that the exploratory operation would not be of much service. Moreover, he called attention to the fact that pyloric carcinoma was not usually fatal *quâ* carcinoma but *quâ* obstruction, and that for the purpose of relieving this latter condition he believed gastro-enterostomy to be the easier and safer operation. Jessett said he was the first surgeon in Great Britain to put Senn's proposals to the test, and the results of his experiments and observations had convinced him of the correctness of Senn's views.

Carter and H. G. Rawdon report $_{\text{Apr.13}}^{6}$ a successful case of pylorectomy for carcinoma, in which the latter employed Senn's decalcified bone plates in making the gastro-duodenal sutures.

At the meeting of the Tenth International Congress Billroth reported, during twelve years in his clinic, 41 resections of the pylorus,—7 men, 34 women, aged 25 to 58; 28 for carcinoma, 1 for sarcoma; duration of operation, one and a quarter to three and a half hours; resected pieces, 5 to 21 centimetres long. Of 29 typical pyloric resections 15 died; of 41 cases 22 died; death from recurrence in from one and a half to eleven years; one young man lived five years after pyloric resection.

Digital Divulsion of the Pylorus.—William Gardner, Adelaide, South Australia, places on record a case in which he performed digital divulsion of the pylorus for stricture.[2] Patient (age not given) had been married twenty-four years; had been troubled with indigestion for several years; lately had vomited every other day; sometimes does not vomit for four or five days, when large quantities are excreted. Examination showed stomach distinctly enlarged. Small tumor, about the size of a walnut, moving with the movements of respiration, can be felt to the right of the median line, just above the umbilicus. Abdomen was opened by transverse incision, about 4 inches long, in the epigastric region. No tumor could be distinguished occupying pyloric region, although walls of that part of the stomach were hard and greatly thickened; no adhesions present. Opening, 1 inch long, in long axis of the stomach, was made with scissors, through which the index finger of right hand was passed and the pyloric orifice found almost completely closed, admitting with some difficulty a No. 6 gum catheter. The finger was introduced into the orifice and gradually opened it so that it could pass easily into the duodenum. Four months after the operation patient reported well and to have gained flesh. R. H. Morten, Adelaide, South Australia, describes a case of supposed pyloric stricture, in which he performed divulsion after having opened the abdomen and stomach in the same manner as detailed in the case above recorded. The pylorus was found to be perfectly patent. The operator referred to the opinion of the late Loreto, as to the diagnosis in cases of pyloric stricture, that it must be made between carcinoma, fibrous stricture, and idiopathic gastritis. With regard to stricture and idiopathic gastritis, Loreto points out that if the vomited matters be carefully examined in stricture the lower layers will consist of acid chyme well digested, whereas in gastritis it is undigested food and little chyme, and in the former a longing for food and in the latter a loathing. It was therefore concluded that the case was one of idiopathic gastritis, and that it was relieved by the gastric incision acting as a strong counter-irritant and the rest the stomach had for five days, when no food was given by the mouth.

Gastro-Enterostomy.—Eiselberg[226] reports 11 gastro-enterostomies, with 5 recoveries, in Billroth's clinic, in the last four and a half years. In 5 of these cases the abdomen was opened for

carcinoma of the stomach; in 3 adhesions were so extensive as to forbid resection; in the other 2 the anterior and posterior walls of the stomach were so involved that the operation could not be performed. In all the 5 cases the incision healed without reaction. Of the 11 gastro-enterostomies 7 were men and 4 were women. The cause of death in the 6 fatal cases was anæmia and cancerous cachexia in 2; hepatic artery was wounded in 1; pneumonia, 1; peritonitis, with competent suture, 2; in 1 case there was perforation from an ulcer.

Billroth [226 p.786] reported 28 gastro-enterostomies in twelve years: 13 men, 14 women, aged from 27 to 58 years; 14 died and 14 recovered. Nine deaths were from collapse. Too close suturing might produce gangrene. It was of physiological interest to note that the shortened stay of food in the stomach, entailed by gastro-enterostomy, did not interfere with digestion. G. F. Beatson [6 Oct. 11] gives a detailed account of 2 cases of gastro-enterostomy, the first of which lived three days and the second four weeks after the operation. The first patient, a male aged 45, had been ill for a period of twelve months, with pain after ingestion of food and other symptoms of indigestion. He had lost flesh to a considerable degree, and in the right hypochondriac region a tumor of an irregular and oval shape, somewhat like a large turkey's egg, and freely movable under manipulation and during inspiration, could be distinctly outlined. Gastric hæmorrhage had not occurred, and examination of vomited matters did not reveal sarcinæ; there was moderate dilatation of the stomach. The diagnosis of malignant disease of the pylorus was made and an operation advised. The stomach was washed out on the evening previous to and on the day of the operation, and the abdomen opened by an incision in the median line between the ensiform cartilage and umbilicus. Prolonged search was not made for a portion of the intestine near to the duodenum, a loop being selected which seemed to apply itself easily to the anterior wall of the stomach, after being carried over the edge of the omentum. The junction was made with great ease by a pair of Senn's bone plates armed with chromic gut. The operation occupied about a half of an hour, and was well borne by the patient. Rectal feeding by peptonized suppositories was solely employed, small pieces of ice being given by the mouth. No untoward symptoms were present until the third day,

when the patient had a weak attack and the temperature rose to 104° F. (40.55° C.), death following shortly after. Autopsy showed firm adhesion between the stomach and bowel at point of junction, the opening admitting the index finger freely. The jejunum had been united to the stomach at a point about 7 feet from the lower end of the duodenum. The bone plates had been greatly acted on by the digestive fluids, being reduced to the thickness of the thumb-nail and broken up into pieces both in the stomach and bowel. It seemed as if only the central parts, unaffected by the decalcifying process, had survived. The tumor was scirrhous in character and occupied the posterior wall of the stomach; the pylorus was patent. The firm union between the stomach and bowel led the operator to conclude that nourishment by the mouth could have been given at an early period and with decided advantage.

The second case was that of a lady, aged 58, who had suffered for more than a year with marked symptoms of malignant disease of the stomach. Inspection of the abdomen revealed the presence of a sausage-shaped tumor lying somewhat obliquely, but almost parallel to the middle line of the body, and occupying partly the right lumbar, umbilical, and hypogastric regions. It was very dense and freely movable; it was not affected by the respiratory movements, which were, however, very shallow and feeble. The operation was performed in this case in the same manner as in the first, with the exception that the stomach, which was found to contain a black, almost tarry fluid, was washed out during and not before the operation, owing to the weak condition of the patient and the use of silk threads instead of chromic gut in the bone plates. The patient recovered well from the operation, and three weeks after the operation sat up daily. Owing to exposure on one of these occasions, she contracted bronchial catarrh, with right pulmonary congestion, and died, despite all efforts made to relieve the condition, four weeks after the operation. The report of the autopsy does not give the point of small intestine selected in this case. The adhesions were firm and the gastro-intestinal opening was oval and barely admitted the index finger. The bone plates had quite disappeared.

Weir delivered a clinical lecture[9] upon the treatment of simple pyloric stenosis by gastro-enterostomy rather than by digital divulsion, and performed the operation upon a patient aged 41,

whose symptoms of vomiting and emaciation had lasted nearly two years. The vomiting of blood but once, with the duration of the case, the absence of a perceptible tumor, together with the continuance of hydrochloric acid in tested meals, led to the conclusion that the stenosis was non-malignant and was possibly due to the contraction of an ulcer. The distension of the stomach was great, holding 8 pints of fluid, when it could be felt 3 inches below the umbilicus. Ewald's salol test revealed the decisive discoloration only one and a half hours after ingestion of the drug. Weir reviewed at some length the various methods of operation employed in the treatment of pyloric disease, and stated that out of 81 cases of pyloric resection with 61 deaths, collected by Winslow, 6 were reported as having been done for non-malignant disease of the pylorus with 3 deaths. He directed attention to the celebrated case of Billroth, in which resection of a carcinomatous pylorus was performed, with turning in the ends of the stomach and duodenum, forming thus blind *cul-de-sacs* and uniting the two by the operation of gastro-enterostomy. This operation, he thought, met the use of anastomotic plates or rings better than the one now in vogue. He reverted to the mortality of the operation of gastro-enterostomy and showed it, in 9 cases of non-malignant stenosis, to have been but 11 per cent. For carcinomatous stenosis, in 24 cases it was 42 per cent. Since the introduction of Senn's apposition bone plates, or some of their modifications, whereby much time in suturing is saved, the mortality in 11 cases of gastro-enterostomy for carcinoma has been a little over 9 per cent. These results, compared with those achieved by the old method, are remarkable. In the case presented by Weir for operation the stomach was washed out for several days with a boro-salicylic solution and the abdomen opened by a median incision between ensiform cartilage and umbilicus. The thumb and index finger of the right hand were introduced and carried down to the vertebral column, the omentum and large intestine having been pushed aside, as Hahn suggests, with a view to seize the end of the jejunum. This plan failed, and, following the suggestion of Luca, a loop of the small intestine sufficiently free to permit easy apposition to the wall of the stomach was selected. The loop of intestine and a portion of the stomach close to the gastro-colic fold were withdrawn from the abdomen and the peritoneal surfaces were sewn together

by a continued silk suture, to correspond to the posterior edges of the catgut rings when inserted, as this could be more easily accomplished before the insertion of the rings. The small intestine was then opened opposite the mesenteric attachment for a distance of 2 inches, the hæmorrhage arrested by temporary clamp pressure, and an elongated Abbe's ring inserted and held in place by six sutures carried through the wall of the bowel about ¼ inch from the incised edge. The stomach was opened to a corresponding extent nearly 4 inches from the pylorus, a ring similarly introduced and fixed *in situ*. The sutures were tied in pairs, beginning with those on the deepest side and alongside the first applied row of peritoneal sutures. A continued suture, beginning where the last one left off, was carried around the anterior surface and secured the surfaces in accurate apposition. This continued suture was of value in two ways: first, in overcoming any failure on the part of the rings to hold in the inverted peritoneum, and, second, being carried some distance beyond the line of the included rings, prevented the formation of a spur in the small intestine as it dragged downward. A large opening is also of advantage in avoiding ill effects should such a spur form. The operation occupied forty-five minutes. Five days after operation the patient was reported as progressing satisfactorily. On the third day he began to take water and beef-tea freely, with rectal enemata of peptonized milk and whisky.

Robinson describes $\frac{1}{\text{Oct. 18}}$ a new form of approximation plates made from rawhide (Figs. 1 and 2), and claims that they possess advantages over those made from decalcified bone, catgut, or rubber.

H. Tuholski $\frac{9}{\text{May 14}}$ reports a case in which he performed gastro-enterostomy and pylorectomy, following in this respect the practice of Billroth in the case to which allusion is made above. On March 29, 1890, he opened the abdomen by an incision, 2 inches long, to the right of and on a level with the umbilicus and upon an imaginary line drawn from the centre of Poupart's ligament to the cartilage of the ninth rib. The pylorus presented itself in the wound, without adhesions, freely movable and about the size of a walnut. Gastro-enterostomy was then performed, the anastomosis being accomplished by Brokaw's segmented rings, supplemented by secondary Lembert sutures surrounding the anasto-

mosis. Pylorectomy was done after the method of Billroth. The patient died twenty-six hours after the operation. Microscopic examination proved the tumor of the pylorus to be epithelioma. W. T. Bull [59 Jan. 15] describes 3 cases of pylorectomy with gastro-enterostomy for carcinomatous strictures of the pylorus. The operations were performed on April 10, August 20, and October 7, 1890, and of the 3 cases the first recovered, the second and third dying,—one at the expiration of the seventh day and one in fifteen hours

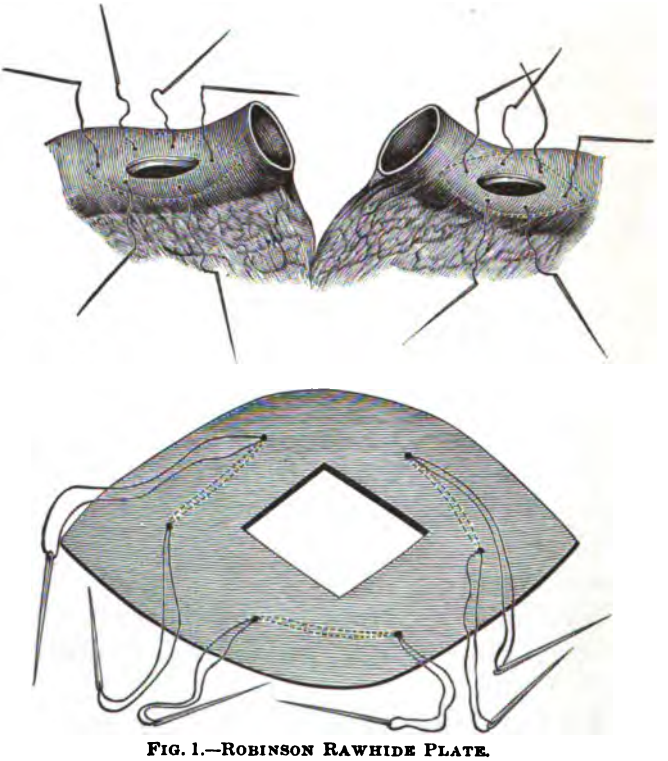


FIG. 1.—ROBINSON RAWHIDE PLATE.
(*N. Y. Medical Journal.*)

after operation. In the first case the omentum was separated from the portion of the stomach to be removed by a double row of silk "chain ligatures," introduced with a curved needle, each embracing only a small portion of tissue. The omentum was cut between the two lines of ligatures. The cut ends of the stomach and duodenum were closed, continuous catgut being used in the mucous coats and Lembert sutures of fine silk in the serous coats. Abbe's catgut rings were employed to make the anastomosis,

being re-inforced by supplementary Lembert sutures. The entire operation in the first case occupied three hours, in the second and third two hours. In a review of the cases reported, Bull stated that he had departed, in the operations, from the typical methods in only a few details. In the preparatory treatment he employed the stomach-pump, while the patient was under the influence of the

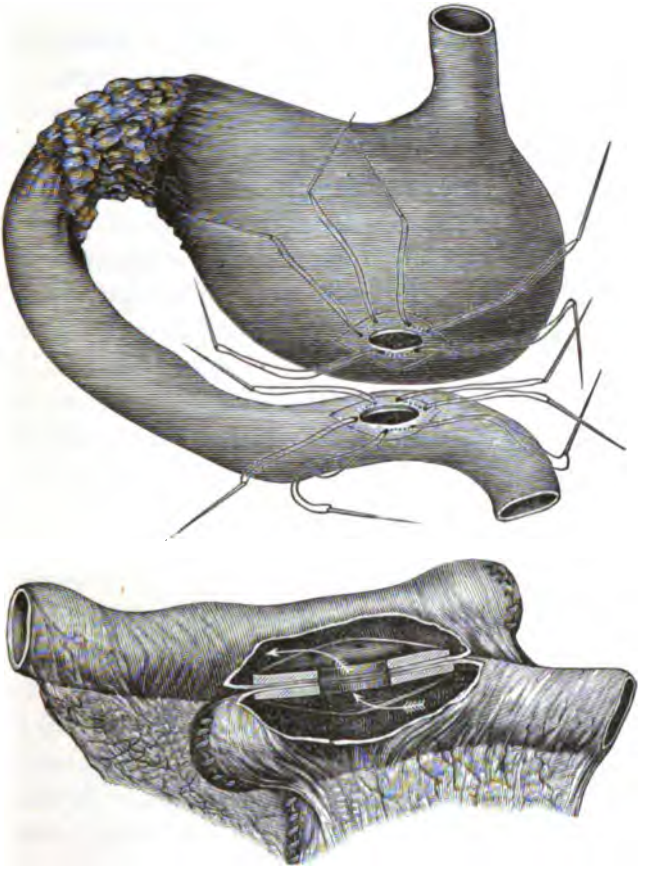


FIG. 2.—ROBINSON RAWHIDE PLATE (INSERTED).
(*N. Y. Medical Journal.*)

anæsthetic, in preference to several washings before the time of the operation, in order to avoid the mental disturbance and physical annoyance inseparable from the former procedure. Although it causes some prolongation of the narcosis, he believes it empties the stomach more thoroughly. The median incision he thinks in every way satisfactory and to be preferred to any other. He

avoids the use of clamps to prevent the escape of the contents of stomach or duodenum. The fingers of an assistant, with the aid of hooks or loops of silk, may be used with advantage to keep the divided ends elevated. Flat sponges in the stomach and plugs of iodoform gauze will close the openings satisfactorily. Strips of iodoform gauze were used to shut off the loop of jejunum while the anastomosis was being made. The continuous catgut suture through the mucous membrane, re-inforced by interrupted Lembert sutures closed satisfactorily the cut ends of the stomach and duodenum. Bull does not regard the rings as an absolutely sure method of uniting the serous surfaces of the viscera, but as a most convenient adjunct to a carefully-applied peritoneal suture. The mucous membrane and serous coats were sutured about the openings in the stomach and jejunum at six points to prevent contraction of the openings. The author calls attention to the fact that the operation of combined pylorectomy and gastro-enterostomy was first performed by Billroth, whom he states attached the loop of jejunum to the lower part of the wound in the stomach, thus avoiding a second incision in the stomach. Of 5 cases reported by him, but 1 recovered,—his first case; of the 4 fatal cases, 1 died from shock and 3 from faulty suturing.

INTESTINAL TRACT.

Intussusception Resection.—Rosenthal[4] describes a successful case of resection of the intestine for intussusception. The patient, aged 35 years, had a chronic intussusception of six weeks' standing, which was at first thought to be an omental tumor. A bent tumor could be felt in the umbilical region, and extending into the left hypochondrium; the bowels acted with fair regularity and without blood or mucus. The patient losing ground, it was determined to explore the tumor. On opening the abdomen, an intussusception was found, which seemed to consist of an invagination of the ileum into the cæcum and ascending colon, with a subsequent dragging of both the latter into the transverse colon. As these could not be withdrawn, the tumor was resected and the end of the ileum sutured into the transverse colon with twelve Lembert sutures. Fæcal extravasation was prevented by two elastic bands. The patient did well, the bowels being opened spontaneously on the tenth day. Out of 25 cases of intussusception,

in which the invaginated bowel could not be withdrawn, 4 were left, the abdomen being merely closed, and all died; in 12, excision was done, with only a single success; in 9, enterotomy was done, with fatal results in all. With the foregoing case, 3 enterectomies have been done, with 3 recoveries.

Harris[9, Sept. 27] reports a case of intussusception in a boy 14 years of age, in whose case laparotomy was performed, and the invagination of the ileum, to the extent of 6 or 8 inches, was relieved. He made an uninterrupted recovery.

G. E. Troynam[267, Nov. 15, '89] describes several operations performed by him for the relief of intestinal obstruction. In a child aged 7, who had an elongated swelling in left lumbar region, with severe pain, with great straining and passage of blood and mucus, he found, on opening the abdomen, invagination of the transverse into the descending colon to the extent of 6 to 8 inches. The invaginated bowel was withdrawn and the abdomen closed. On the eighteenth day the patient was allowed to sit up, and on the twenty-sixth was discharged well.

The author reports also a case of obstruction due to bands, which he divided after passing an aneurism-needle beneath them. The patient recovered without any untoward symptoms.

Rupture of the Small Intestine.—Lewis reports for Conley[99, Sept. 4] a case of rupture of the ileum in which laparotomy was performed. The patient, aged 28, while tending a circular saw, was struck in the right side of the abdomen by a flying piece of plank; was thrown several feet; did not become unconscious, but could not rise or move without great pain; vomited shortly after the injury, ejecting contents of the stomach; when seen at the hospital was in great pain; lay on his left side, with his legs drawn up, tossing nervously and screaming; great tenderness in the right lumbar and right umbilical regions; abdomen not swollen, but its walls were as tense as a drum-head; no signs of shock; temperature normal; later in the day symptoms of shock were present. In the evening laparotomy was performed; on opening the abdomen by a median incision, a fetid, yellowish, watery fluid, with a few melon-seeds, escaped. The intestines were reddened, and covered in many places with a fibrinous exudation. Withdrawing a loop of the ileum, a rent about 1 inch long, with ragged and contused edges, was found. This was closed by a continuous Lembert

suture of fine silk. In the neighboring intestinal wall there were several small areas of ecchymosis. The abdominal cavity was irrigated with atomized boric-acid solution, and a glass drainage-tube passed to the depth of the pelvis. The patient died sixteen hours after the operation.

Esson reports for J. D. White[284 May] a case of rupture of the ileum in a patient who had received a severe blow in the right iliac region, as the result of a fall. He had been the subject of a right scrotal hernia for several years, and it was thought the fall had caused a return of the condition. On admission into the hospital there was a large, painful swelling in the right groin, extending into the scrotum; great tenderness over the whole abdomen; pulse small and weak; countenance anxious, and condition of great depression. Shortly after the accident he was seen by two physicians, who applied taxis under ether, without effecting reduction. On incising the sac it was found that there was no strangulation, and reduction could be easily made. The patient's condition being unrelieved, the wound was continued up into the iliac region, and cavity of the abdomen opened and found to be full of contents of the small intestine, with the peritoneum in state of active inflammation. On careful search a rupture of the ileum, about ¾ inch long, was found. This wound was sutured and abdominal cavity washed out. Patient died twenty hours after admission.

C. J. Hood contributed notes[2 Apr.] of a case of rupture of the jejunum in which laparotomy was performed by Cheyne. The patient, aged 18, while pushing a costermonger's barrow by the back rail, the handles being away from him, was struck by the back rail across the upper part of the abdomen, causing him severe pain, but not causing him to faint. He was able to push the barrow a little further and to walk about a mile. On admission to the hospital he was examined, and there was no wound nor any bruising evident over the abdomen. Although he complained of great abdominal pain, there was very little tenderness and his breathing was not markedly thoracic. Temperature 97°; pulse 80 and weak. On the day following peritonitis was present and laparotomy was performed by Mr. Cheyne. The abdomen was opened by an incision in the median line between the umbilicus and pubes. The intestines were partially matted together with lymph and of a bright crimson-lake color. In the *cul-de-sac* there

was some turbid fluid containing half-digested food. The abdomen was washed out with warm water and the incision continued upward 3 inches to find the opening in the intestine. At the upper part of the cavity behind the liver and stomach the peritonitis was most acute, and a rent was found in the upper end of the jejunum. This was brought into the upper part of the abdominal wound and held in position by sutures to form an artificial anus. The abdomen was thoroughly washed out and the incision closed except at the upper end. The patient was returned to bed very much collapsed and died nine hours after the operation.

Senn contributes an interesting paper[9] on the surgical treatment of volvulus, and reports a case of this condition of the sigmoid flexure which he relieved by a successful laparotomy. He presents the following conclusions: 1. The predisposing causes of volvulus are either congenital or acquired, and consist in elongation of certain segments of the intestines, abnormal length of mesentery, and adhesions. 2. Irregular distribution of intestinal contents and violent peristalsis are the most important exciting causes. 3. Volvulus is most frequently met at the sigmoid flexure and the lower portion of the ileum. 4. Secondary volvulus, on the proximal side of other forms of intestinal obstruction, is not a rare occurrence. It is also frequently developed during an attack of peritonitis. 5. As a rule, the symptoms are more acute and intense if the volvulus is located above the ileo-cæcal region. 6. Vomiting in cases of volvulus of the sigmoid flexure is not a constant symptom. 7. The most important physical sign of volvulus is a circumscribed area of tympanites which corresponds to the location of the volvulus, but this sign is only of value before general tympanites has set in, and, therefore, enables the surgeon in many cases to make an early and positive diagnosis. 8. All cases of volvulus should be treated by laparotomy if reposition cannot be accomplished by rectal insufflation of hydrogen gas. 9. Reposition should not be attempted without evisceration. 10. Evacuation of intestinal contents by a free incision should be practiced in every case where general distension of the intestines is present. 11. Enterectomy becomes necessary if any considerable portion of the intestinal wall has become gangrenous. 12. Irreducible volvulus should be treated by establishing intestinal anastomosis with permanent exclusion of the seat of obstruction

from the active fæcal circulation. 13. Recurrence of volvulus can and should be guarded against by shortening the mesentery by folding it upon itself parallel to the long axis of the bowel and suturing the apex of the fold to the root of the mesentery.

Lumbar Colotomy.—Cousins reports[6 Jan. 11] a case of intestinal obstruction caused by fæcal accumulation in which he performed right lumbar colotomy. On opening the colon a large quantity of fæces escaped and the symptoms were relieved. A few days after the operation fæces began to pass *per vias naturales*, and at the end of a month the bowels acted nearly every day, and no fæcal matter passed out of the lumbar opening. The patient left the hospital with a narrow fistula at the site of the wound.

Cousins also reported a case of right lumbar colotomy performed for relief of an extensive stricture of the ascending colon 8 inches long. Half a bucketful of fæcal matter was evacuated on opening the colon. The patient was relieved by the operation, but died in forty-eight hours from exhaustion. Necropsy revealed much thickened condition of the walls of the colon. The cæcum was greatly distended by a hard, fæcal concretion and many pinhole perforations had permitted the extravasation of the intestinal fluid into the peritoneal cavity. The pelvis contained about a pint of dirty pus. During life the whole body had a horribly fæcal odor.

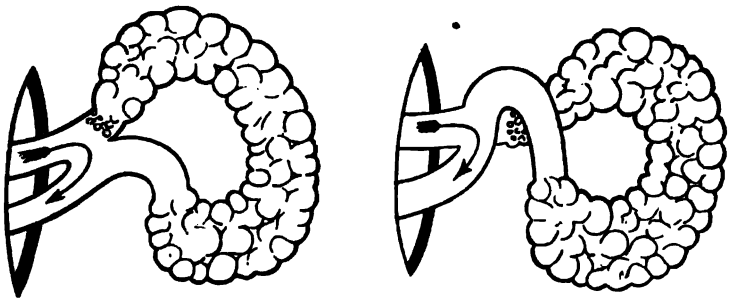
Hutchinson[806 July, '90] advocates strongly abdominal taxis in the treatment of intestinal obstruction. He says: "The first point in abdominal taxis is the full use of an anæsthetic, so as to obliterate all muscular resistance. Next (the bowels and bladder being supposed to be empty) the surgeon will forcibly and repeatedly knead the abdomen, pressing its contents vigorously upward, downward, and from side to side. The patient is now to be turned on his abdomen, and in this position to be held up by four strong men, and shaken backward and forward. This done, the trunk is to be held feet uppermost, and shaking again practiced directly upward and downward. Whilst in this inverted position copious enemata are to be given. The whole proceedings are to be carried out in a *bona fide* and energetic manner. It is not to be the name of taxis, but the reality, and great patience and perseverance are to be exercised. The inversion of the body and succussion in this position are on no account to be omitted, for they are possibly the

most important of all. I do not think I ever spend less than half or three-quarters of an hour in the procedure."

Senn believes that taxis has a limited field of useful application in some forms of intestinal obstruction, but in others, as volvulus, it must be looked upon not only as a useless, but an exceedingly dangerous, performance.

The current literature for the year contains reports of cases of intestinal anastomosis accomplished by means of Senn's approximation bone plates and their substitutes with successful results. The method has commended itself by reason of the perfect apposition obtained and the material shortening of the time of the operative procedures.

The accompanying figures exhibit intestinal anastomosis in



(*Revue Méd. de la Suisse Romande.*)

cases reported by Comte, [197] where resection of carcinomatous portion was not made.

Ileo-Colostomy.—Senn read a paper at the meeting of the American Medical Association, [61] on intestinal anastomosis in the ileo-cæcal region, reporting 2 cases of resection of the cæcum for carcinoma, in which the anastomosis was made by his decalcified bone plates. Of the 2 cases, one recovered, the other dying from septic peritonitis six days after the operation, the infection arising from an ulcer found at a point which corresponded to the space between the two layers of peritoneum of the meso-colon. He describes at some length the operative technique, discussing the abdominal incision, the use of the decalcified bone plates and their value over those plates or rings which are made from hygroscopic and indestructible or inabsorbable materials, incision of the bowel,

insertion and fixation of the plates, scarification of the serous surfaces, approximation of the intestines, anchoring of the seat of anastomosis, drainage, closure of abdominal incision, dressing of the wound and the after-treatment. The different steps of the operation are illustrated in the accompanying drawings.

Intestinal Enteroliths.—Khalofoff relates $\frac{530}{\text{No.5,p.464}}$ an interesting case of the removal of two enteroliths by laparotomy from a woman aged 50, who had suffered from periodic attacks of excruciating pain about the right iliac fossa, recurring once or twice monthly,

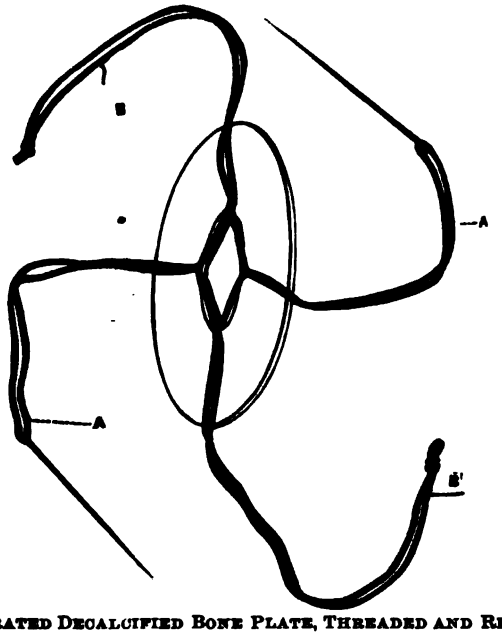


FIG. 1.—PERFORATED DECALCIFIED BONE PLATE, THREADED AND READY FOR USE.
A, fixation or lateral sutures; B, apposition or end sutures.
(*Jour. of Am. Med. Association.*)

and accompanied by abdominal distension, vomiting, and constipation. The attacks had begun to appear about twenty years before admission to the hospital, and had so increased as to make her totally incapable of work. Her bowels acted quite regularly during the free intervals. Examination of the abdomen revealed the presence of two hard, smooth, globular tumors, situated one above the other, somewhat downward and to the right from the umbilicus, the upper being as large as an orange, the lower about the size of a hen's egg. The tumors were freely movable in the vertical and lateral direction, but less so antero-posteriorly, the move-

ment causing great pain. The tumors had gradually increased in size; positive diagnosis could not be made; abdomen was opened by an oblique incision over the tumors, and the colon containing them presented itself. The bowel was opened by a longitudinal incision 4 inches long, and the smaller mass removed; the larger one required an enlargement of the abdominal and intestinal

FIG. 2.—ILEO-COLOSTOMY WITHOUT RESECTION OF CÆCUM, SHOWING PLATES IN POSITION, ONE IN THE ILEUM, THE OTHER IN THE COLON.

A, lateral or transfixion sutures passed through the margin of the wound; A A, end ligatures hanging out of the wound; B, posterior row of superficial or Lembert sutures.

(*Jour. of Am. Med. Association.*)

wounds. The position of the colon was found to be considerably dilated, its walls intensely hypertrophied; mucous membrane thickened, softened, red-violet, and covered with numerous profusely-bleeding polypoid excrescences; the wounds were closed with silk sutures. On the ninth day the sutures were removed and the bowels were moved by castor-oil. On the twenty-first day patient left the hospital well. The extracted bodies proved to be very

light enteroliths, resembling potatoes in their shapes, measuring 6 and 4½ centimetres in diameter, and, on examination, were found to consist of fine, ligneous hairs or fibres of some tree, with admixture of rye- and oat- barb scales. The belief was that the patient had been habitually eating bad bread, made of flour mixed with some ligneous substance. Many years ago she had probably had a localized inflammation of the colon, accompanied by more or less profuse secretion of mucus. Some masses of inspissated mucus

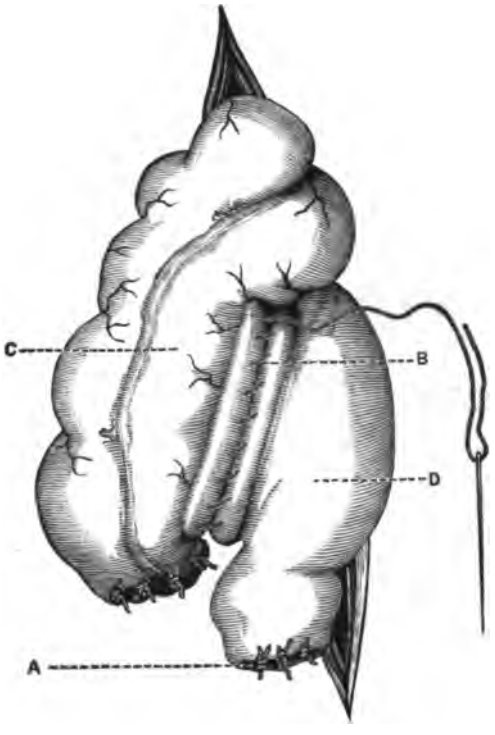


FIG. 8.—ILEO-COLOSTOMY AS SEEN AFTER RESECTION OF THE CÆCUM.
A, closed ends of the colon and ileum directed downward; B, serous surfaces over the anterior margins of the plates united by a number of stitches of the continued suture.
(*Jour. of Am. Med. Association.*)

adherent to the intestinal wall formed the nuclei around which the insoluble ligneous cells collected and gradually formed the masses.

APPENDICITIS, TYPHLITIS, PERITYPHLITIS.

In an interesting paper contributed by McBurney to the proceedings of the New York Surgical Society, [1] he describes at length his experience with early operative interference in cases of

disease of the vermiform appendix, and presented patients from whom he had removed the vermiform appendix. He referred to the brilliant work done by the late Dr. Sands, and stated that, "beginning with the first suggestions of Willard Parker, which taught surgeons how to save many lives, although by a slow and often unsatisfactory process, Sands ended his work in this direction by showing us how we might cut short, at its very inception, a disease that is even to-day responsible for many deaths." He dis-

FIG. 4.—ILEO-COLOSTOMY, COMPLETED AS SEEN WITHOUT RESECTION OF THE CÆCUM. (*Jour. of Am. Med. Association.*)

cussed the pathology of the disease, and directed attention to some of the special symptoms, the weight and value of which he regarded as important. Pain, to a greater or less extent, is present in all cases of appendicitis; but it is not always present in the iliac fossa and absent in other parts of the abdomen. General abdominal pain is often all that the patient will complain of during the first few hours of his attack, and it requires careful examination to locate the cause of pain in the iliac fossa. After the first

few hours it becomes more and more evident that the chief seat of pain is in the fossa, and the general pain then usually subsides. Frequently the epigastric region is the point first complained of. He regarded the *exact* locality of the greatest sensitiveness to pressure to be usually one of importance. He had found, in all of his operations, the appendix either thickened, shortened, or adherent very close to its points of attachment to the cæcum, and this must, in the early stages of the disease, determine the seat of greatest pain on pressure. He believed in every case the seat of greatest pain, *determined by the pressure of one finger*, has been very exactly between 1½ and 2 inches from the anterior spinous process of the ilium, on a straight line drawn from that process to the umbilicus. He referred to the other symptoms usually present, viz., chill, vomiting, fevers, rigidity in the abdominal muscles or the affected side, abdominal distension, tumor, rapid and irritable pulse, and elevation of the right thigh, and thought that the combination of symptoms present would usually render a correct diagnosis as to the seat of the disease quite easy; but, with reference to the stage of the disease, the diagnosis is often very doubtful. He had not found rectal examination at the onset of the disease of any value, and condemned the use of the exploring-needle at the beginning of the disease, while it might be occasionally permissible at a late stage.

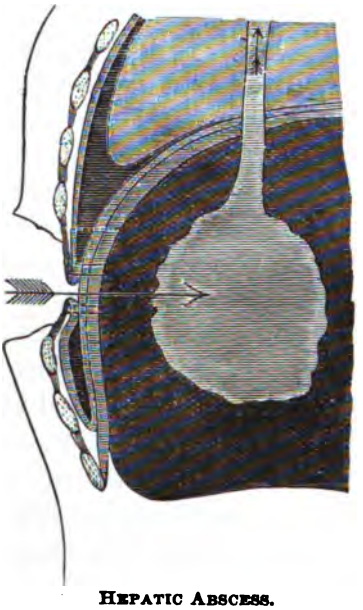
His method of operation consists in opening the abdomen by the incision employed by Sands, following, as nearly as possible, the right edge of the rectus muscle, the centre of the incision lying opposite to or a little below the anterior iliac spine, on a line drawn to the umbilicus. When the external oblique aponeurosis is divided by this incision, the aponeurotic structure, in which the other abdominal muscles end, comes into view, and is divided without cutting muscular fibre. After careful separation of adhesions the appendix is tied off with a double ligature of silk or catgut close to the cæcum and removed. Careful disinfection of the stump is made. After removal of the appendix the cavity is disinfected and packed with iodoform gauze, a drain having been inserted. The upper half of the abdominal wound may be tightly closed with strong sutures, or, if sutures are introduced throughout the whole length of the wound, the central and lower ones may be left loose, and may, after one or two dressings, be tied. A com-

plete dressing is applied, and preferably held in position by a firm bandage to prevent extrusion of the intestines by vomiting or distension. The packing is usually removed on the third day, and replaced with less, the cavity rapidly granulating.

Weir[9 Mer.] makes some remarks on intermediate laparotomy for appendicitis in its quiescent stage, and questions whether sufficient data exists at the present moment to warrant the use of so severe a recourse as a laparotomy in those cases in which the disease, previously of a threatening form, has returned once more to a period of quiet. He does not think it settled that surgery is justified in its interference by the removal of an appendix when symptoms of urgency are not present. Treves, who has advocated this method of treatment, has, verbally and otherwise, stated that the application of this intermediate laparotomy must, of necessity, be an extremely limited one. Frequent attacks of recurrence, sufficient to impair the patient's usefulness in life, Weir believes to be the only reason of weight amply to justify the performance, in the quiescent period, of an operation of acknowledged risk, even in the most careful hands. Weir remarks, further, that the significance of pain on the finger-tip pressure, spoken of by McBurney, between the anterior spine and the umbilicus, is somewhat negatived by the investigations of Schüller, who found that the end of the cæcum, and consequently the beginning of the appendix, is situated, on the average in a line running from the middle of Poupart's ligament to the umbilicus, at the junction of its middle and lower thirds.

Dennis[1124 V.S.] presented for the consideration of the Fellows of the American Surgical Association, at the meeting of May 14, 1890, the question as to the propriety of the removal of the appendix vermiformis during the intervals of recurrent attacks of appendicitis. The question, the author stated, was a new one in surgery and its solution could not be made at once. At present it could be discussed from a theoretical point of view. The experience derived from the few reported cases would throw some light upon this hitherto unexplored field of operative surgery. He quoted the statistics of Fitz, showing that in 89 per cent. the appendicitis is solitary, while in 11 per cent. it is recurrent. In the recurrent cases, the termination may be in resolution, formation of pus, and evacuation of abscess, and in perforation and general peritonitis. Nearly all the authorities agree that the majority of cases terminate in

resolution. The arguments submitted against excision during a quiescent period in relapsing patients are: (1) the danger to human life; (2) the difficulties of a positive diagnosis; (3) the development of ventral hernia; (4) the lack of conclusive evidence that excision of the appendix is attended with permanent relief; and (5) the results of relapsing attacks may afford an immunity from danger in the future. These propositions were discussed at length and the conclusion reached that it was wise to condemn the operation of excision of the appendix during the quiescent period as a routine operation.



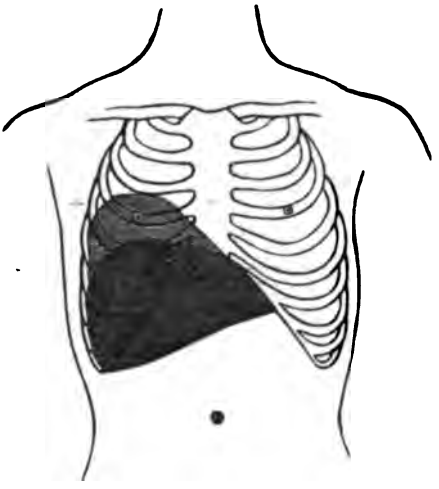
HEPATIC ABSCESS.
(*Brit. Med. Journal.*)

A large number of operations in cases of appendicitis are reported in current medical literature, and interesting *résumés* of the entire subject are presented in papers by Morton,[1118 Jan.1] Stimson,[1 Oct.2] and Roux.[197 Apr.20]

LIVER AND GALL-BLADDER.

Hepatic Abscess.—Godlee has published[2 Jan.11,25] a series of lectures on the "Surgical Aspect of Hepatic Abscess," illustrating the subject by the accompanying drawings and presenting the following conclusions: 1. Pyæmic abscesses do not call for surgical interference, or, if in rare cases one should point, it is only opened to relieve symptoms, but without hope of doing permanent good. 2. The same observations apply to abscesses resulting from suppurative phlebitis of the portal vein. 3. Multiple abscesses associated with dysentery or ulceration of the bowels are very unfavorable for surgical treatment. They must, however, be opened and treated on the same lines as the single or tropical abscess, because they cannot be certainly diagnosed. 4. Single abscesses of the liver, whether tropical or not, must, if it approach the surface, be opened; the following precautions being adopted: (*a*) If it present at the epigastrium, the presence of adhesions must be ascertained before incising the liver. (*b*) If through the

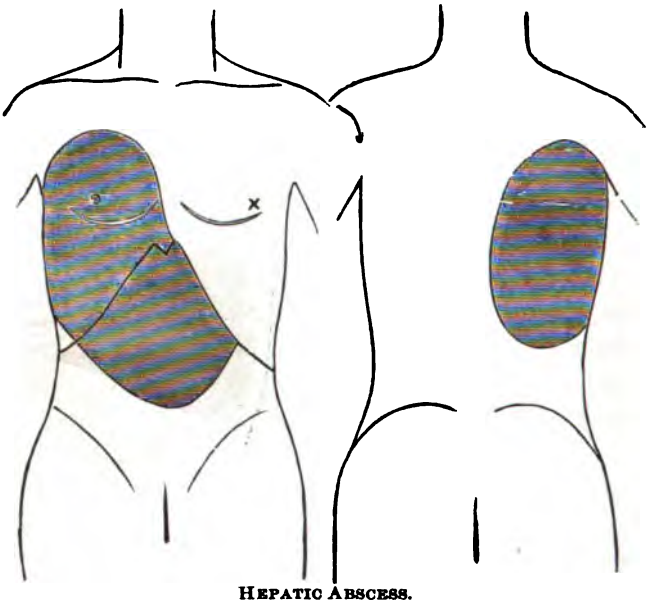
chest-wall, a spot must be chosen below the normal limit of the pleura; but, if by chance either pleura or peritoneum be opened, the opening must be closed with a double row of stitches before incising the liver. (*c*) Strict antiseptic precautions must be throughout adopted, either carbolic acid or some slightly soluble salt of mercury being employed for the dressing. (*d*) The tube must be of large size at first, and a tube of some sort must be kept in until the discharge is reduced to a very minute quantity. If the abscess have burst into the lung, pleura, pericardium, peritoneum, or kidney, and the position of the abscess can be clearly determined, it must be opened without delay. If the position of an abscess be only suspected and the patient be losing ground, it is right to puncture the liver in the most likely situations, bearing in mind that, though usually quite harmless, a slight amount of risk accompanies this very trivial operation. This rule applies to cases in which the abscess has ruptured into any of the cavities enumerated above. If, on the other hand, whether the abscess have ruptured or not, there are no means of diagnosing the whereabouts of the matter, and the patient be not losing or even gaining ground, the surgeon should hold his hand for a time. 5. Hydatids of the upper and back part of the liver are to be treated upon the same lines; but in cases of this sort, and in those of subdiaphragmatic abscess, it must be remembered that the diaphragm may be pushed up to a very great height, thus closely simulating intra-pleural suppuration. 6. Empyema, pericarditis, and peritonitis caused by rupture of a hepatic abscess or hydatid must be promptly dealt with on general principles. Harley [2] reports cases of abscess of liver, as shown in the drawings (page 49).



HEPATIC ABSCESS.
(*Brit. Med. Journal.*)

Hepatic Abscess in a Female Infant.—Pereira [206] describes a case of hepatic abscess in a European female infant, aged 20

months, who had had dysenteric symptoms for about a month, with hepatic symptoms. The child was emaciated, febrile, with a waxy complexion, and there was a well-defined, fluctuating swelling in the region of the liver, most prominent at the tenth intercostal space. The abscess was tapped and about 12 ounces of blood-stained pus evacuated. A week later the abscess re-opened spontaneously and continued to discharge for a period of three weeks; after this the cavity was daily syringed with a solution of boracic acid, gr. x to ℥j (0.64 to 30 grammes), after which the discharge ceased and the cure was permanent.

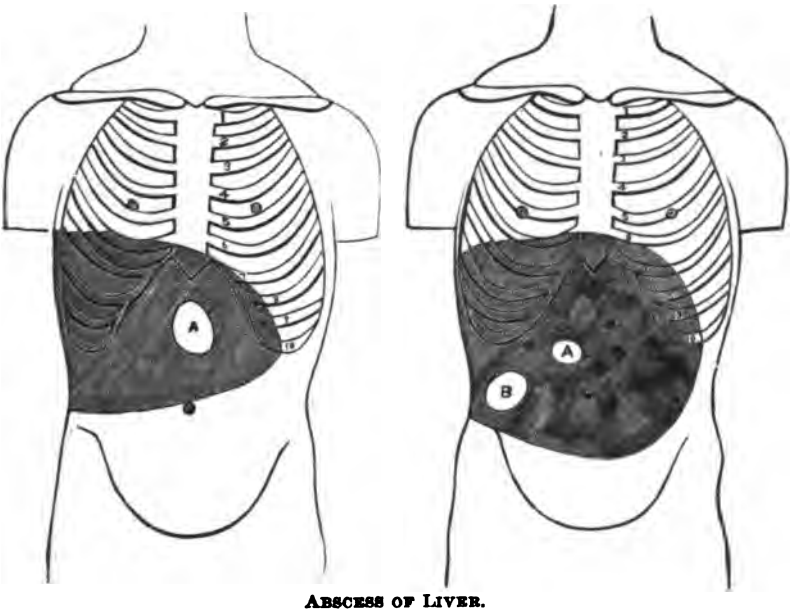


HEPATIC ABSCESS.
(*Brit. Med. Journal.*)

Dalton [663 Aug.,'99] reports a case of stab-wound of the left lobe of the liver, the wound having been inflicted by a long, narrow-bladed knife, which, it is stated, made a small wound half an inch in length on the upper surface of the lobe and a large, lacerated wound on the under surface of the organ near the diaphragm, which gave rise to an alarming hæmorrhage. During the operation of laparotomy, which was performed, it was necessary to use large quantities of iodoform gauze to control the hæmorrhage. In twenty-four hours, owing to the patient's condition, the wound was opened and the dressing removed, this operation being accompanied by severe bleeding. The use of iodoform gauze controlled

again the hæmorrhage, but the condition of the patient was almost hopeless. In eight hours a marked change occurred and gradually the patient recovered. It is interesting to consider the character of the wound made by the long, narrow-bladed knife in this case, and it is somewhat difficult to understand how the wound on the upper surface should present the characteristic features of an incised, and that on the under surface those of a lacerated, wound.

Hydatid Cyst.—Thomas gives an account [267 Dec.15,'99] of enormous hydatid cyst occurring in a young man, aged 25, who had been suffering from an enlargement of the abdomen for over a year.



ABSCESS OF LIVER.
(*Brit. Med. Journal.*)

When examined the abdomen was found greatly distended, with pronounced protrusion of the umbilicus; fluctuation could be elicited on percussion, but there was no intestinal resonance; subcutaneous veins over chest and both hypochondriac regions were unusually distinct; moderate tenderness on pressure over abdomen. Exploratory puncture yielded a little puriform fluid, the canula being soon blocked. The diagnosis of large abdominal hydatid cyst was made. The abdomen was opened by an incision 3 inches in length below the umbilicus, and over the most prominent part of the distended surface. The sac was opened freely

and over two-thirds of a bucketful of puriform fluid and daughter-cysts escaped. The latter varied in size from a pea to an orange, and were several hundred in number. The mother-cyst was broken into fragments and stained deep green. The solid and fluid contents were carefully removed by douching with boric-acid solution, aided by sponges and forceps. An examination showed that the cyst had started from the under surface of the liver, had grown down through the abdomen and filled the pelvis, whilst the stomach and the greater mass of the small intestine had been pushed below the margin of the thorax into the region of the spleen; the fibrous capsule was adherent anteriorly and posteriorly to the walls of the abdomen, and the cæcum, colon, and rectum were thus completely concealed. Drainage was employed after the operation for a period of three months.

Cabot[99 Jan. 9] reports 2 cases of abscess of the liver implicating the pleural cavity. In the first case respiration was performed, the needle being introduced through the tenth intercostal space, just behind the posterior axillary line, drawing off 25 ounces of a thick, stringy, reddish-brown fluid, which, microscopically, showed degenerated pus- and blood- cells, small fat-drops and granular matter insoluble in acetic acid, hæmatoidin and bilirubin crystals. With acetic acid the fluid gave a very marked mucin reaction. An incision, made just in front of the point where the aspirating needle had entered, evacuated 2 quarts of fluid of similar character. Two large drainage-tubes were introduced, the cavity washed out, and the antiseptic dressing applied. The patient made a prompt recovery.

In the second case, aspiration was done through the seventh intercostal space, and fluid similar to that withdrawn in the first case found. In this space an incision was made, entering the thoracic cavity, in which but little pus was found. Dividing the diaphragm, a large quantity of pus, mixed with coagula, was evacuated. Drainage-tubes were introduced, and the patient made an aseptic recovery.

Cholelithotripsy.—Kocher[54 No. 12] describes an operation of cholelithotripsy for the relief of occlusion of the ductus choledochus. Owing to completely shrunken gall-bladder, cholecystenterostomy could not be performed. The ductus choledochus was exposed by means of a transverse abdominal incision parallel to the edge of

the thorax, and all adhesions to the omentum and intestines were divided. The duct was seen much dilated, having a circumference of about 2 centimetres, due to an impacted stone. This, and also a smaller one, were crushed between the thumb and middle finger of the operator. The operation was followed by prompt relief and rapid recovery. The *débris* of the calculi were recovered from the fæces after passage, and presented, when dry, a volume of 2½ centimetres.

Cholecystotomy.—Robson has related [2] 2 cases where the operation had been performed on the strength of symptoms alone, without physical signs. One patient had had severe attacks of spasms for twelve months, the pain starting in the right hypochondrium. There had been no jaundice and there were no physical signs of tumor. At the operation six gall-stones were removed from the gall-bladder and cystic duct. As the gall-bladder was too far from the surface to fix to the external wound, the omentum was brought up and sutured to the margins of the gall-bladder and parietal peritoneum, thus shutting out the general peritoneal cavity. The wound healed in a month, and in three months the patient was apparently well. The second patient had suffered severely for nine months with hepatic colic. One stone was removed by operation, and the wound healed in two weeks. Six months afterward the patient was in perfect health.

Cholecystectomy.—Terrier [10] records his second cholecystectomy, which was performed successfully upon a woman, 55 years of age, who had suffered from hepatic colic for twenty-six years. Her sufferings were so severe that they almost caused syncope. On examination the liver was found enlarged, but the gall-bladder could not be felt. There was no jaundice until just before the operation. The abdomen was opened through the right linea semilunaris and a voluminous and distended gall-bladder found. Adhesions to the omentum were easily detached, and about half a litre of clear, viscid, almost colorless fluid was drawn off. An opening was made and a number of calculi removed with difficulty. The neck of the gall-bladder was then ligatured and its body and fundus removed, and the abdominal wound was closed. The operation occupied two hours. Afterward a great quantity of bile escaped from the wound. The patient made a good recovery. Terrier thinks the median incision preferable to the one

he employed in this case, as it permits the surgeon to reach the under surface of the liver and neck of the gall-bladder more easily. The free oozing of blood, caused by the separation of the bladder from the liver, can be stopped by sponge-pressure or thermal cautery; large vessels can be tied lightly. Care must be taken in ligaturing the neck of the gall-bladder, otherwise bile may escape.

Senger, in discussing the question of the surgical treatment of gall-stones, [4 Jan. 18] takes exception to the statement of Langenbuch that cholecystectomy is, so far as the life of the patient is concerned, a much safer operation than cholecystotomy. The operation which he prefers consists in suturing the skin and parietal peritoneum of the abdominal wound, drawing out nearly the whole gall-bladder from the peritoneal cavity, turning over its fundus upon iodoform gauze, protecting the abdominal wall, and suturing it to the skin to prevent retraction. In two days the gall-bladder can be incised, the stone removed, and the wound closed. If the sutures fail to hold, resection of the fistula may be made and a second attempt made to close it. When firmly closed the gall-bladder may be returned to its position, or, the retaining sutures being cut, it may gradually recede into the cavity.

Kümmell discusses [60 No. 18] the surgery of the gall-bladder and presents the different methods of operation now practiced: 1. Cholecystotomy—the fixation of the gall-bladder in the abdominal wound, opening it with the formation of a biliary fistula. 2. Ideal cholecystotomy—opening the gall-bladder, evacuating its contents, suturing the incision, and returning the bladder to the abdominal cavity. (Performed first by Bobbs.) 3. Cholecystenterostomy—the operation devised by Winiwarter, consisting in the formation of a fistula between the small intestine and the gall-bladder. 4. Cholecystotomy combined with ligature of the cystic duct—the operation devised by Zielewicz. 5. Cholecystectomy—the operation of Langenbuch. To the above may be added the operation performed by Credé, Kocher, and others,—cholelithotripsy,—as already described (page 50), and the above suggestion of Senger as to a method of performing cholecystotomy. Of all the operations, cholecystotomy, with the formation of a biliary fistula, is regarded as the safest. The first cholecystotomy was that performed by Bobbs, and was designated as the ideal

operation. Cholecystenterostomy is an operation of value in permanent occlusion of the ductus choledochus, as by this means the bile is emptied into the intestine. Ligature of the cystic duct after cholecystotomy is an operation possessing advantages in those cases in which extirpation of the organ is impossible, or, by reason of its small size and overlapping by the liver, a biliary fistula cannot be formed. Prompt atrophy of the bladder may be expected after ligature of the duct. Cholecystectomy would be the most radical operation and prevent future trouble if the formation of gall-stones took place only in the gall-bladder. Cases are recorded in which calculi were found to have formed in the liver.

PANCREAS.

Simple Cyst.—Filippoff[696 Jan.; 96 Oct.] describes a case of cyst of the pancreas, treated successfully by abdominal section, incision, and drainage, in a woman aged 65 years, who had complained of vomiting after meals, loss of appetite, severe pain, dyspnœa, and general weakness. Three years before admission into the hospital she noticed a slowly increasing tumor in the epigastrium. During the last six months the tumor had been growing rapidly, the pain had become incessant and vomiting frequent. On examination the patient was found emaciated, skin sallow and wrinkled, sclerotics yellowish, and the abdomen much enlarged. The left hypochondrium and the adjoining parts of the epigastric and mesogastric regions were occupied by a globular, smooth, elastic, fluctuating, but slightly movable, tumor of the size of an adult head. On inspiration it was slightly displaced downward. Percussion showed the tumor to be distinctly separated from the liver and spleen by a tympanitic zone. On palpation the growth was found to extend deep downward or backward. Temperature, pulse, and urine normal. A simple pancreatic cyst being diagnosticated, the abdomen was opened by median incision, commencing three fingers' breadth below the ensiform cartilage and extending 12 centimetres in length. A large-sized trocar was passed into the cyst which presented itself, and a large quantity of an alkaline, dark-brown fluid removed. Manipulation showed that the tumor was developed from the head and adjacent portion of the body of the pancreas, wedging its way between the stomach and duodenum. It was firmly adherent to the adjacent organs as well as to the intestines

and omentum. Partial excision was practiced, the sac being sutured to the abdominal wound, washed out with boric-acid solution, and drained by two large tubes. On the fourth day an eczematous rash appeared around the wound. On the eighteenth day after, the patient was discharged with a minute fistula and in excellent condition.

Traumatic Cyst.—Chew reports [36 July] a case of traumatic cyst of the pancreas, caused by the passage of the wheel of a heavily-loaded wagon over the upper part of the abdomen of a boy aged 14, in which the cyst was ruptured after hypodermatic puncture, and laparotomy performed successfully by Cathcart. At the time of the accident the patient was admitted into the infirmary and treated for the injury, and was discharged in fourteen days relieved, without swelling of the abdomen or other abnormality noted. Two months later he was re-admitted, and on examination left side of abdomen was found swollen, the swelling occupying left hypochondriac region and extending from it into the left lumbar and umbilical region, an inch below and to the right of the latter. Change of position does not affect size or position of tumor. On palpation, margin of swelling well defined; tumor firm and resisting; no pain on pressure; temperature normal; splenic tumor suspected. Examination of blood showed decrease of red corpuscles, apparent increase of white ones, and numerous microcytes. Measurement over most prominent part of swelling, 26½ inches. With a hypodermatic needle ½ drachm (2 grammes) of a transparent, reddish fluid was evacuated, the needle having been entered at the most prominent point. Immediately after the withdrawal of the needle the patient screamed and writhed with pain, which, at first localized, soon spread over all of the abdomen. Flattening took place where the tumor had existed and bulging of the flanks. Temperature fell rapidly from normal to 97.2° to 97° F. (33.33° to 36.11° C.). Vomiting of greenish matter came on and great collapse supervened. Abdomen was opened at once by a median incision from a point 2½ inches below ensiform cartilage to below umbilicus and about 40 ounces of dark-colored sanguineous fluid escaped; kidneys and spleen found to be normal. A partially-collapsed cyst was found behind the stomach and was freely opened, giving exit to more clear-brown fluid. As the cyst could not be drawn into the wound, it was drained by a counter-opening

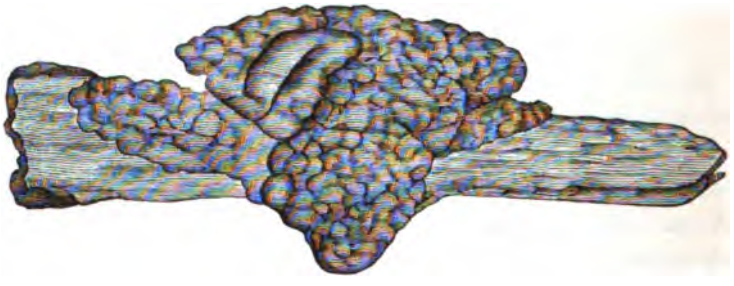
below and behind the point of the twelfth rib of the left side. The cavities of the cyst and of the abdomen were washed out with warm boracic-acid solution and the abdominal wound was closed. In a month and a half the patient was sent to the Convalescent Home in good condition. In his remarks upon the case, Cathcart believes the cyst to have been undoubtedly one of the pancreas, owing to the following reasons: 1. Because such cysts are reported to have followed severe injury to the epigastric region, as this patient received. 2. Because the position of the cyst corresponded to that of the pancreas. 3. Because the reactions of the fluid, especially in its changing starch into glucose, corresponded to those of previously described pancreatic cysts. In speaking of the use of the hypodermatic needle, his case proved, he thought, that the procedure involves considerable risk when the cyst-wall is thin, although Senn advises an exploratory puncture with a fine and perfectly aseptic needle of a hypodermatic syringe as furnishing material diagnostic information. The drainage by posterior counter-opening was imperative in the case, and proved to be perfectly satisfactory. A table is appended giving 12 operations for simple pancreatic cysts and 4 for traumatic cysts, with 6 deaths and 10 recoveries.

Kammerer reports[1] a case of pancreatic cyst occurring in a patient as the result of traumatism. Three weeks after the accident, a severe strain while pulling a truck, a swelling was noticed. This, about three months after the accident, began to increase in size, rapidly assuming that of a man's head, and occupied the epigastric and left hypochondriac regions. Tapping withdrew a yellowish fluid, alkaline in reaction, containing considerable albumen, but no ferments, uric acid, or hooklets. An incision from ensiform cartilage to the umbilicus opened the abdomen, and it was found that the cyst had developed in the bursa omentalis, having on its anterior surface the gastro-colic ligament firmly adherent to the cyst-wall. The gastro-colic ligament was sutured to the parietal peritoneum in the abdominal wound, and ten days later the cyst was opened by the galvano-cautery and about 2½ quarts (2½ litres) of the same fluid as that withdrawn by tapping were evacuated. A drainage-tube was inserted and in two weeks the cyst shrank rapidly, leaving at the time of the report only a small sinus 2 or 3 inches deep. The question of a correct diagnosis was considered in the light of the position of

the tumor, the history of traumatism, rapid growth, colicky pains, and absence of some or all of the components of pancreatic fluid.

Ruggi[537 Feb. 15] gives an account of the successful removal by laparotomy of a carcinomatous tumor of the pancreas from a woman aged 50. The fragments of the growth removed weighed 650 grammes (21 ounces) and was a shapeless mass of pulp, bearing no resemblance to the normal pancreas. Microscopic examination proved it to be a glandular carcinoma. The patient made an excellent recovery and her digestion is perfect.

Briggs[109 Mar.] describes a case of tumor involving the pancreas which he removed successfully by laparotomy from a woman aged 45. Tapping evacuated a dark, coffee-colored fluid containing numerous small bodies resembling hydatid degeneration. The



TUMOR OF PANCREAS.
(*St. Louis Med. and Surg. Journal.*)

tumor was hard, smooth, globular, and freely movable. On opening the abdomen by an incision from ensiform cartilage to the umbilicus, the tumor was found closely adherent to the omentum, transverse colon, and stomach. A ligature was thrown around the attachments and the tumor removed entire, including the tail of the pancreas.

The patient made a satisfactory recovery. Microscopic examination of the mass showed it to be sarcomatous, with evidence of a pre-existing hydatid shown by the hooklets.

With the exception, possibly, of the first case reported above, in which the conversion of starch into glucose was accomplished by the fluid withdrawn from the tumor, there does not exist positive evidence as to the exact nature of any of the growths removed, and it is a question whether they can be designated properly as cysts or tumors of the pancreas.

SPLEEN.

Hydatid Cyst.—Braine[62 Sept.] relates a case of hydatid cyst of the spleen in which laparotomy was performed successfully in a man aged 34. Three years previously the patient noticed a swelling in the left hypochondriac region, which for three years increased slowly, then it extended into the epigastric region, bulged out the false ribs, and extended upward toward the nipple and downward into the iliac fossa. It measured 20 centimetres vertically and 21 transversely. Surface smooth and uniform; fluctuation beneath the false ribs; deep percussion elicited slight hydatid fremitus. Aspiration drew off 3 litres and a few grammes (over 3 quarts) of clear fluid. Slight improvement followed, but in three months the tumor was larger than before. Laparotomy was performed by an oblique incision, 12 centimetres in length, two fingers' breadth below the cartilages of the false ribs. It having been found impossible to draw the cyst completely out of the abdominal cavity, it was fixed by two silver-wire sutures to the angles of the wound and opened to the extent of the abdominal wound. The cyst-wall was then freely resected and the edges secured by eight silk sutures to abdominal incision, including all of the structures. The cyst-cavity was emptied of a number of daughter-cysts and a large quantity of membranous shreds and washed out with 3 litres of boiled water. Two large drain-tubes were inserted and the wound covered with iodoform gauze. Six months later the fistula was closed and the patient was in good health. The rarity of the affection is commented upon by the author.

Hatch[6 Nov. 22] reports a fatal case of splenectomy performed upon a Hindoo aged 30. The operation was performed by a "free abdominal incision." Alarming hæmorrhages accompanied the separation of the tumor; the ligature was applied and the tumor removed. The peritoneal cavity was cleansed, the pedicle inspected, and the abdominal wound closed and dressed. A saline injection was introduced into the right basilic vein, as the patient was in rather a critical condition. Death ensued on the evening of the day of operation. "Examination of the spleen showed that it was a suitable one for removal; it was extremely hard and much pigmented; there were some rents in the capsule where adherent to the diaphragm."

Willien[617 June] has placed on record a fatal case of splenectomy

in a child aged 13. The tumor, after removal, weighed 3½ pounds.

Local Treatment of Enlarged Spleen.—Mosler[84 Vol.1] has been led, by his experience, to frame the following rules for the injection of drugs: 1. Only enlarged spleens of firm consistence are suitable, provided these are not accompanied by an extreme degree of anæmia or by evidences of the hæmorrhagic diathesis. 2. Before the injections a prolonged use of drugs is necessary (these drugs are not mentioned by name), in order to act upon the contractile elements of the spleen, and so diminish the amount of blood in the organ, and, as far as possible, to render narrower the lumen of the vessels; the application of an ice-bag over the spleen is especially useful a few hours after and before the injection. 3. Fowler's solution is the most satisfactory drug to inject. Mosler states that he has recently had very good results following on the injections in enlarged leukæmic spleen. In 1 or 2 cases in which the disease proved fatal there was shown to be considerable thickening and constriction of the capsule, and Mosler is of opinion that this contraction has a favorable result not only by producing a general lessening in size of the spleen, but also by checking the leukæmic process, thus considerably improving the prognosis.

HERNIA.

Diaphragmatic.—Jacobsen and Mitchell record an interesting case of diaphragmatic hernia discovered post-mortem in a man 57 years of age. The patient had been suddenly attacked with most violent abdominal pain and passed into a stage of collapse, dying unrelieved about twelve hours after the beginning of the attack. The necropsy showed that the great omentum and entire stomach had passed through an opening in the diaphragm, had entered the left pleural cavity, and had forced the left lung, which was not larger than a man's fist, into the extreme upper limit of the pleural cavity. The heart was displaced far to the right, its left border being just in the middle line. The pericardium was somewhat inflamed. The stomach was of large size, and occupied the greater part of the pleural cavity. About 2 inches from the pylorus was found a clean-cut, punched-out perforation on the posterior wall toward the lesser curvature, surrounded by a large abscess-cavity. The acute condition is believed to have arisen

from the discharge of the contents of this abscess into the peritoneal cavity through the hernial opening. The hernia is supposed to have occurred eighteen years previous, when the patient, who was a railroad employé, was caught between two buffers and the left side and arm were severely crushed.

An account is given [22 Apr.16] of a case of diaphragmatic hernia occurring in a sailor, aged 24, an inmate of the military hospital at Trieste. After five days' constipation the patient was attacked with severe colic, death ensuing in a short time. The post-mortem examination revealed a rupture in the posterior left side of the diaphragm, through which the large intestine had protruded behind the heart, rising as high in the thorax as the cartilage of the second rib. The spleen, stomach, and colon were all displaced toward the opening.

Lynde reports [51 Dec.,'90] a case of diaphragmatic hernia occurring in a male child, aged 3½, in which an operation was performed by O'Dwyer, with a view to replace the intestines and close the opening in the diaphragm. Symptoms of severe dyspnœa, marked prostration, with high temperature, accompanied attacks of constipation. Physical examination showed flatness over posterior portion of left chest, with absence of respiratory sounds; moderate dullness anteriorly, with broncho-vesicular breathing at upper part; somewhat tympanitic resonance about sixth intercostal space in axillary line; heart displaced to the right, with apex-beat most distinct in the epigastrium. Until the time of operation a brisk cathartic always afforded relief. Believing the case to be one of empyema, aspiration was done, with negative results. A second attempt, with a larger needle and then with a trocar of larger calibre, failed to evacuate any fluid. Believing the pus to be too thick to flow, an opening in the sixth intercostal space, between the axillary and mammary lines, was made, and the cavity was explored with the finger. The patient gave a slight cough as the finger was withdrawn, and about 6 inches of the small intestines were forced out, which required much effort to replace. It was now decided to attempt replacement of the intestines and closure of the hernial opening by an operation through the thorax at a point lower down. Accordingly, an incision 2 inches long was made in the tenth interspace and, by removing about 3 inches of the ninth and tenth ribs and drawing down the floating ribs, ample

room was obtained. The hernial opening was found to be situated in the muscular portion of the diaphragm, about 1½ inches in diameter, the external margin reaching close to the ribs. Considerable difficulty was experienced in returning the intestines, owing to the retraction of the abdominal muscles. The cæcum and part of the omentum were reduced last. The intestines were prevented from returning, during the paring and suturing of the opening, by two flat sponges attached to holders. Strong silk was used to close the opening. When the diaphragm was allowed to resume its position the pressure from below was so great that it filled at least one-half of the pleural cavity. Antiseptic gauze was packed around the sutures to relieve the strain, but without avail. Death occurred six hours after the operation. At the autopsy, the hernial opening was found to have opened partially, the sutures not being effective in approximating the edges. The left lung was collapsed. The right lung was very much compressed and contained a deep mold of the heart. No mesenteric attachments existed below the cœliac axis, the descending colon alone being normal in this respect. In reviewing this case, the following points of interest were alluded to: (1) the physical signs in this case were identical with those of empyema; (2) the frequent high temperatures, for which there was no apparent cause except constipation; (3) the futility of operation in diaphragmatic hernia of long standing, in which such a large mass of the intestines occupies the pleural cavity; (4) the point of election for operation is through the thorax, in preference to laparotomy. Resection of the ribs affords ample room and light. Recent wounds of the diaphragm, which are usually near the periphery, can be readily reached through the tenth or eleventh interspace.

Umbilical Hernia.—H. Pelkington $_{\text{May 10}}^{6}$ relates a case of large umbilical hernia in which spontaneous laceration of the integumental covering had occurred, with protrusion and strangulation of the intestines. The tumor measured 2 feet 2½ inches in circumference, having irregular pouches in three places. At the umbilicus there was a rent of the skin, through which protruded more than 8 inches of intestines. This wound was enlarged, the intestines returned, and the wound closed by quilled sutures. The patient recovered.

Ventral Hernia.—Morgan $_{\text{May 19}}^{6}$ describes a case of enormous

ventral hernia in a woman aged 56. The overlying tissues were so thinned that the peristaltic movements of the intestines could be perfectly studied. The opening was above the position of the umbilicus. C. Daniels [645 Jan.4] publishes the account of a case of congenital ventral hernia in an infant, the walls of which were so transparent that the liver, small and large intestines, and vermiform appendix could be distinctly seen through them.

Obturator Hernia.—Firth [2 Apr.19] reports a case of strangulated right obturator hernia occurring in a spare and feeble old woman, who was suffering from symptoms of strangulation. Examination found, at the upper and inner part of the thigh, and extending forward toward Scarpa's triangle, a large, tense, fluctuating swelling, painful on deep pressure, but with no impulse on coughing. The femoral vessels could be plainly felt to its outer side, and no hernia could be felt in either the inguinal or femoral ring. Operation was performed by making a vertical incision, 4 inches long, over the tumor, midway between the line of the femoral artery and the spine of the pubes, and carried through skin, fat, and fascia till the adductor longus was reached; the upper edge of this was pulled downward and inward, and by using the handle of scalpel the fibres of the pectineus muscle were separated without being cut, when the sac came into view. This was thick and tough, and on opening it a very large quantity (more than a pint) of blood-stained fluid, with a urinous and offensive odor, was let out. Then the bowel could be felt deep down in the upper and outer part of the wound. The thyroid membrane was then nicked in a downward and inward direction, after which, with a little manipulation, the bowel was returned into the abdomen; the sac was then dissected out, ligatured in two pieces, and cut off; a counter-opening was made toward the inner and back part of the thigh for drainage, and the wound brought together. There was no hæmorrhage. The patient recovered from the anæsthetic, but died rather suddenly, in the night, of collapse.

Post-mortem examination showed that 8 or 10 inches of the small intestine had been strangulated, but were in good condition. The author states that out of 25 recorded cases recognized during life, 17 were subjected to operation, 8 were relieved by taxis, but only 5 altogether were saved by the two methods of treatment. He thinks that possibly the high mortality is due to late recognition

of the condition, and, therefore, late interference unfavorable in all forms of hernia. Rectal or vaginal exploration, he states, should not be omitted in doubtful cases, as it is by this means that in more than one case the diagnosis has been established.

Lang[35] places on record an account of the anatomical facts ascertained by dissection of a case of obturator hernia in an old woman much emaciated. The orifice of the sac was seen on the left side, at the upper border of the obturator foramen, and could be easily reached by the index finger in the vagina. The superficial division of the obturator nerve lay in close relation to the sac anteriorly; the deep division was on the postero-external aspect. The obturator artery, descending from the deep epigastric, wound around its inner side in very close relation to it; the obturator vein lay also on the inner side. The sac was 1¼ inches internal to the femoral vein, internal, therefore, to the position of an ordinary femoral hernia.

Weir[9] introduced a novel feature in a case of inguinal hernia, which he operated upon for the radical cure. In addition to exposure of the sac, return of its contents to the abdomen, ligature and removal of the sac at the internal ring, he inserted a bone plate, which would more effectually close the ring. The plate of bone was removed from the scapula of a recently-killed dog, and a semicircular opening was cut out of its upper surface, so as to protect the spermatic cord from undue pressure. Several small holes were punched in the plate, which was thoroughly disinfected and introduced into the wound.

Hernia of the Vermiform Appendix in the Right Femoral Canal.—Keetley[22] reports this condition in a female patient, aged 53, who had been subjected to great strain while cleaning a window. On admission to the hospital, a rather tense swelling was found in the position of a right femoral hernia. It was not tender, had a fairly good impulse on coughing, but could not be reduced. Application of ice-bag diminished the size of the hernia, but it remained irreducible. Soap enema opened the bowels freely. Herniotomy was performed by dividing the tissues carefully down to the hernia. No definite peritoneal sac could be found. The protruding stricture was found to be a hard, white, tubular process, which, when opened, contained a small quantity of gelatinous material in a central cavity. It was thought to be

either a Fallopian tube or the vermiform appendix. Microscopical examination proved it to be the latter. When isolated, a ligature of thick catgut was passed through it and tied very lightly with a Staffordshire knot. The part below the ligature was then removed, and the fibrous tissue forming the sac was dissected out. A counter-opening was made in the outer flap and a drainage-tube passed from the wound through it, the original incision being completely closed with silver sutures. The patient made an uninterrupted recovery. The author states, in his remarks upon the case, that he could not find, in the search he had made, any other record of a case of hernia of the vermiform appendix through the femoral ring. Only one record of a case of strangulated hernia of the vermiform appendix into the inguinal canal was found.

Left Cæcal Hernia.—Black $_{\text{Nov.}}^{2}$ describes this very rare abnormality occurring in a chronic male lunatic, aged 69, who had for five years been the subject of a left oblique scrotal hernia, which was always partially reducible. On opening the abdominal cavity the large gut was seen crossing obliquely from the right lumbar region at the lower level of the kidney and applied to the posterior wall of the abdomen till it disappeared through the left internal inguinal ring. On making firm traction the bowel gradually slipped from the ring, and the contents of the hernial sac were then seen to be the cæcum, with the appendix vermiformis and a small portion of the small intestine at its junction with the cæcum. The sac itself was perfect; the length of the bowel included in it was about 8 or 9 inches, and there were no remains of a meso-cæcum for this extent. Treves referred to a case of left inguinal hernia in a male, containing the cæcum previously described, $^{1125}_{78}$ and informed Black that a still more remarkable case occurred in his practice,—one of left inguinal hernia in a woman, —containing the cæcum and appendix. Black thinks the hernia in the case reported by him was probably due to the loose attachment of the beginning part of the large bowel, and his experience does not sustain the description usually given in the text-books of its close application to the right iliac fossa.

Bennett $_{\text{Feb.1}}^{6}$ contributes an account of a case of hernia of the cæcum through the right inguinal canal, entirely wanting in a peritoneal sac, in which strangulation at the internal abdominal ring co-existed with an intussusception through the ileo-cæcal

valve. On incising the overlying tissues a hard mass, of doubtful nature, was opened, from which a large quantity of perfectly clear fluid escaped, such as often comes from a hernial sac. The structure opened was the cæcum, and projecting into it through the ileo-cæcal valve was an invaginated piece of gut 3 inches long. The cæcum was entirely free from peritoneal covering, but behind it, adherent to the testicle, was a piece of omentum, lying in a peritoneal sac. All attempts to reduce either the intussusception or the hernia having failed, and as the critical condition of the patient forbade abdominal section, a temporary artificial anus was made, with a view to future proceedings for the restoration of the normal state of the parts. The patient did not rally, but died in three days.

The following points were discussed: 1. The extreme rareness of extra-peritoneal hernia of the cæcum. 2. The small percentage of cases of strangulated hernia of all kinds in which the cæcum was found in the sac. 3. The relation of the intussusception to the production of the hernia, and *vice versâ*. 4. The escape of clear, watery fluid from the bowel when opened. The co-existence of two such conditions as extra-peritoneal hernia of the cæcum and ileo-colic intussusception appeared to the author to be unique amongst recorded cases. The author appended a table of the only cases in which the cæcum was found to form any portion of the hernial tumor in a series of 565 herniotomies described in the records of strangulated herniæ at St. George's Hospital. The principal points indicated by the table were (1) the comparative infrequency of strangulated hernia of the cæcum in any form, the number of cases met with in this large series of 565 herniotomies amounting to only 1.59 per cent.; and (2) the extreme rareness of uncomplicated cases of this form of strangulated hernia, two instances only being found in this same series, *i.e.*, 35 per cent. The very high rate of mortality (66.6 per cent.) was clearly due to the critical condition of the majority of the patients at the time of operation.

In the discussion, Treves said that most of the text-books stated that hernia of the cæcum contained no sac, that all herniæ possessed sacs except those of the bladder and cæcum. He had found 15 cases of hernia of the cæcum in which either the details were correctly given or the specimens were extant. Thirteen

of these cases had a complete sac, while in 2 there was practically little or none. It was possible for a cæcal hernia to lose a great part of its sac, for the small gut might pull up a portion of the peritoneum from the face of the cæcum, and this baring of the cæcum might happen in other ways; cæcal herniæ became inflamed, frequently incarcerated, but rarely strangulated; the association of intussusception with cæcal hernia was remarkable; the co-existence of a neighboring sac containing small bowel was comparatively common.

Hulke regarded the case reported by Bennett as unique. He reported 2 cases of cæcal hernia: one in a boy, in which the hernia consisted of cæcum and appendix vermiformis; the other in a woman, in whose case the hernia contained cæcum only, the vermiform appendix and ileo-cæcal valve both being within the abdomen. The case was doubly interesting, on account of the presence of two ureters on the right side, one of them opening into the floor of the urethra, while the other terminated normally at the trigone.

Walter has collected statistics of 387 cases of hernia operated on in Hamburg between 1880 and 1888, $\frac{404}{\text{No. 389}}$; $\frac{96}{\text{Aug.}}$ and has deduced interesting conclusions from a study of these cases. Of the 387 cases, in only 165 could distinct histories of radical operation be found: 51 incarcerated and 40 non-incarcerated inguinal herniæ (of the latter 3 were double); 64 incarcerated and 10 non-incarcerated femoral herniæ,—a total of 165 operations on 162 patients. Of 88 inguinal herniæ, 79 were males and 9 females; of 74 femoral herniæ, 70 females, 4 males; 95 herniæ on the right side and 67 on the left side of the body. In 95 cases sac was tied high up, extirpated, and abdominal ring sutured; in 17 cases sac tied, extirpated, but ring not sutured; of these, 15 were femoral herniæ; in only 3 cases the inguinal canal was slit open. In 53 cases omentum was tied with catgut, cut off, and the stump returned to the abdomen. In congenital cases the sac was only partially removed; testicle and spermatic cord always carefully preserved; vas deferens cut once and immediately sutured. As a rule, the ring was sewn up. In the 74 femoral herniæ it was attempted in all but 11 cases. Catgut and silk and, later, silver wire have been used to close the ring. At first wire was removed during healing process; later, it has been left imbedded in the wound. Drainage was used at first, but finally abandoned, the tissues being so brought together

that no dead cavity remained. The skin-wound was closed by a continuous suture of No. 1 catgut. The healing of the wound occurred without any reaction in 41 per cent. of the incarcerated herniæ and in 35 per cent. of the non-incarcerated cases. Phlegmon of the abdominal wall followed in 3 cases, 1 fatal; peritonitis in 3 cases, all fatal. The main points in the treatment of the wound after a radical operation is to obtain a complete primary union not only of the skin, but of the wounded surfaces made by extirpation of the sac, together with a closure of the hernial exit. By abandoning drainage, the healing of the wound was much simplified and shortened. The danger of the septic infection is not very great, as it only occurred seven times in 165 cases, or a percentage of 4.24. Sepsis occurred more frequently after inguinal than femoral operations, and is explained by the more complicated nature of the former wound. The time of complete healing of the wound varies from sixteen to twenty-one days. The mortality is given as 4 cases in 51 herniotomies, or a death-rate of 7.8 per cent. Other statistics are given, showing, in incarcerated herniæ, a death-rate of $6\frac{4}{5}$ per cent. as a direct result of the operation, 4 per cent. as a result of the strangulation, and 4 per cent. from other causes. Of 40 radical operations on 37 patients for non-strangulated herniæ, 2 died,—one from heart-failure (fatty heart) and one from suppurative peritonitis and fatty liver. Of 10 operations for non-strangulated femoral hernia, all terminated favorably.

The results in 43 cases examined and found cured showed that 22 were free from return at the end of two years, 12 at three years, 2 at four, 2 at five, 1 at eight, 2 at ten years. According to the opinion of several writers, patients who, at the end of a year after the operations, suffered from no return, may, with great probability, be considered as cured. In 105 cases Anderegg found 75 per cent. of the recurrences took place within the first year after the operations. Audrechen in 39 cases found 50 per cent. of return. Anderegg and Socin, in 1888, found recurrences in 39 per cent. out of 100 cases. Even if recurrence takes place after operation, the patient is benefited, as the recurrent hernia is generally small and easily kept in place by a light truss, and causes no marked disturbances.

DISEASES OF THE RECTUM AND ANUS.

By CHAS. B. KELSEY, M.D.,
NEW YORK.

The most important work of the past year in this special department of surgery has been in the direction of the formation of artificial anus, the closure of the same and of fæcal fistulæ, and the treatment of extensive prolapsus incurable by the ordinary methods of operation. To these subjects we shall, therefore, devote the greater part of the present *résumé*.

In the treatment of hæmorrhoids, fistula, and the milder affections of the rectum, nothing of importance has been added to our existing knowledge. The advocates of injections are still enthusiastic, and occasionally a bad accident comes to light without seeming to dampen their ardor. Peskind[222 June] reports what certainly seems to be an embolus in the liver, as he diagnosticated it. Surgeons of repute generally abandon the hypodermic syringe after a few trials and one bad case, and return to the methods which have stood the test of years of practice.

COLOTOMY.

Perhaps the strongest article of the year, and the one containing most food for thought, is by Bryant,[645 Dec. 31, '90] containing as it does the ripe experience of the man who may be called the father of the operation, and who has performed it one hundred and seventy or eighty times. As he says, the practical adoption of the operation was very slow; for twenty years after Amussat's success, or thirty years ago, when he undertook his first lumbar operation, it had never been done but once in Guy's Hospital, and that by Hilton, ten years previously.

At that time the procedure was looked upon with scant favor, though sanctioned as a *dernier ressort* in congenital malformations and other cases where all other means had failed. No man has done more than Bryant to popularize the operation as a palliative

measure in cases of disease of the rectum, whether cancerous or benign, and whether attended by obstruction or not. As an illustration of the change in opinion on this point, I will mention that three times within the past year patients have come to me, asking to have the operation performed as a relief from the suffering caused by non-malignant ulceration of the rectum, and that two of these were women who had seen the benefits of the procedure on the persons of their acquaintance, and the third a physician.

Bryant's article is not, however, devoted to a consideration of the propriety of the operation, but entirely to the relative merits of the lumbar and inguinal incisions; and on this point he places himself in direct antagonism to the present prevailing tendency in favor of the incision in the left groin, denying that it has any advantages over the lumbar operation, and thinking that under certain conditions it may be positively inferior in safety and results. His arguments are so strong, his statements of personal experience so positive, as to remove the discussion at once from questions of personal bias between different operators to questions of clinical and anatomical fact.

Take, for example, the following: "The *third* reason which has been adduced as an argument in favor of iliac colotomy is that by it there can be no possibility of the surgeon mistaking the small intestine, duodenum, or stomach for the large intestine; and that abnormalities of the colon do not mean failure of the operation, since the abdomen can by the inguinal wound be carefully searched.

"The first half of this argument may have weight with some minds, but it does not recommend itself to my own. I do not regard it a fair one, for the mistakes to which attention has been drawn are clearly due to errors of judgment or carelessness which belong more to the operator than the operation; and in estimating the value of an operation we are bound to assume that the surgeon is reliable. Errors of all kinds must creep into all work, and particularly into surgical work, but they cannot be legislated for. May I ask, are mistakes in iliac colotomy quite unknown? Has the small intestine never been opened in error? With respect to the abnormalities of the colon, about which so much has been written and said, and upon which the advocates of the iliac operation base an argument against lumbar colotomy, I hardly know

what to say. That such may occur I, as an anatomist, must admit; but, if so, I presume to suggest that this same chance of abnormality may occasion trouble in the iliac as in the lumbar method, although such may possibly be of a different form. But, in a surgical point of view, is the chance of an abnormality of the colon being present an argument which should tell more against lumbar than iliac colotomy? My own experience says no, with no uncertain sound, since out of my 170 cases of lumbar colotomy I have not met with any instance which gave rise to a serious trouble, or that rendered the operation in any way a failure. On one occasion I had to increase my oblique incision forward and pick up the colon at the brim of the pelvis, thus opening the peritoneum; but I subsequently restitched the edges of the peritoneum to the bowel and completed the operation as usual, and with a good result. With this experience, therefore, whilst we may admit the possibility, we may, I think, fearlessly dismiss the probability of the presence of any abnormality of the bowel from our minds, and regard it with no more fear than we do the risk of meeting with an anatomical irregularity in any operation upon an artery for aneurism or other purpose. In a surgical point of view, the risk need not influence practice, and certainly should not tell against the lumbar operation."

Again: "I may say that, in 170 cases of lumbar colotomy that I have performed, I have but twice, knowingly, opened the peritoneal cavity."

How is this statement to be reconciled with the figures given by those who have published the results of their studies of the normal relations of the colon to the peritoneum (Treves, Allingham Jr.)?

According to these, in a certain proportion of cases, the ascending and descending colon will be found destitute of mesentery, and hence uncovered by peritoneum for a portion of the posterior wall, as shown in Fig. 1. This proportion is given differently by different investigators. Treves places it at 74 in 100 cases on the right side and 64 in 100 on the left. In a certain other proportion of cases, represented by Fig. 2, the ascending and descending colon have a short mesentery, or, in other words, are completely covered by peritoneum, so that they can neither be seen nor reached without opening the peritoneal cavity. This

proportion, according to Treves, is 26 out of 100 on the right side and 36 out of 100 on the left.

And yet, Bryant, in 170 cases, has never opened the peritoneum but twice! Who shall decide?

What Bryant says of the possibilities of abnormalities in the iliac operation is certainly true, and my own experience tends to convince me that no man knows, when he incises the peritoneum for a colotomy, exactly what he is going to find. But the advocates of the inguinal incision hold that, when an abnormality is found, that incision gives great advantages over the lumbar in choosing the best way of overcoming the difficulty, and this we believe Bryant has not refuted. In a recent case, I found the sigmoid flexure so tightly bound in the brim of the pelvis by a short mesentery that the finger could only with difficulty be passed under it, and it could not be brought into

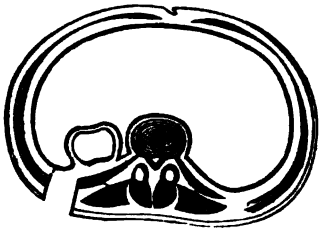


FIG. 1.—COLON WITHOUT MESENTERY.

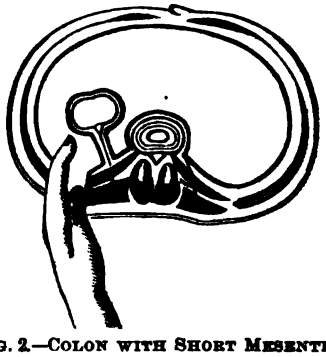


FIG. 2.—COLON WITH SHORT MESENTERY.

(*Kelsey's "Diseases of the Rectum and Anus."*)

the wound at all; and yet, a few inches higher up the gut was found free, loose, and normal. Nothing can illustrate better the advantages of the inguinal incision.

Considering now the question of the practical results of the two operations, it seems to us that Bryant has made a damaging admission, although unconsciously.

The object of a colotomy is to remove the irritation of fæces from the diseased rectum (we will leave aside the cases in which it is done for obstruction), and this is accomplished not merely by opening the gut, but much more by forming a spur at the point of opening, so that fæces not only have a chance to escape, but are prevented from passing onward past the artificial anus. In proportion as this end is attained the operation is a success. It does not seem to be disputed by Bryant that the inguinal incision

down upon a loose coil of gut, that can be pulled freely out of the wound and fastened in any way most agreeable to the operator, offers better advantages for the formation of this spur than the lumbar incision; though he does hold that these advantages are attended by other disadvantages not to be found in the lumbar incision, and that a sufficient spur can be obtained in the latter operation by less handling of the gut. He points out the danger of handling a weakened and distended gut, and of searching with the fingers in the peritoneal cavity for the portion desired.

The latter danger, in the case of an operator of ordinary skill and cleanliness, must be very trifling; but a weakened and distended colon is not an easy thing to stitch to the wound, and protrusion of the small intestine from the wound in large quantity is a serious complication which will sometimes occur in the inguinal operation, and cannot occur in the lumbar. So far, his objections are most justly taken.

These side issues being all admitted, we think no one of the better-known advocates of the inguinal operation would consider a colotomy which did not *at once and completely* prevent the passage of fæces beyond the opening as anything but a failure in the exact proportion as it failed to accomplish this end. What, then, are we to think of the following statement? "I should say that in at least three-fourths of the patients who convalesced from the operation and experienced its benefits the artificial anus was a success; that is, that the whole of the fæces were discharged through it, and the local disease was left unirritated by the passage of fæcal matter. In the remaining fourth this desirable result was not secured, and fæces at times—particularly when they were liquid—passed downward and added to the local irritation of the obstructing disease." Again: "In some instances this desirable result was secured rapidly after convalescence, in others it was not obtained for several months, and in 3 or 4 cases I have had to enlarge the wound backward toward the kidney to bring it about."

We think the advocates of the inguinal operation would consider these results as not at all satisfactory. The editor makes a very sharp spur by passing a silver suture under the gut and drawing it taut, and expects no fæces to pass that spur after the gut is

incised; and he believes this to be the general expectation and aim of those who perform the inguinal operation.

On another point Bryant's argument has much weight, and yet is not unanswerable. He says: "The prolapse of the bowel at the artificial opening, which has been adduced as an objection against lumbar colotomy, does not rightly or of necessity belong to it. To judge by my own experience, it is imaginary. In the iliac operation the objection is admitted, and sought to be remedied by an operative measure which is in itself of far greater magnitude than any lumbar colotomy I have ever done or seen."

This proposition may naturally be divided into two parts, and, as to the first, we have again one of those irreconcilable differences of statement to which attention has already been called. The advocates of the inguinal operation claim that prolapsus to an annoying extent is apt to follow the lumbar operation. Bryant finds it imaginary, as judged by his own operations. That it does occur, as after the inguinal, there can be little doubt, and because it may occur after both operations it has little weight as an argument against either. If the practice of doing a supplementary operation, consisting of an excision of several inches of the gut, were a common one, or one sanctioned, or practiced, or found necessary, by any proportion of those advocating the inguinal incision, Bryant's argument would be unanswerable, and would in itself be enough to decide the question under discussion. But this has never been the case. Because one advocate of the inguinal operation has seen fit to try this experiment in two or three cases, with one fatal result, others are not committed to it, more especially as they have openly and at once repudiated it. We judge Allingham Jr. has not carried it beyond his first reported cases; at least, we have failed to see any more reported; and, as a clinical fact, it will be found that, though some degree of prolapse may follow the inguinal operation, it is controllable by pressure in the upright position, becomes spontaneously reduced in the prone position, is a matter of trifling importance, and one not calling for the performance of a second operation for its relief much more dangerous than either the lumbar or iliac operation originally.

Bryant admits that "the greater convenience of the iliac over the lumbar wound may at first sight seem plausible, but this apparent advantage is more than counterbalanced by the greater

difficulty that exists in keeping any dressing or compress in position over the anterior opening, to prevent the escape of the intestinal contents, than is ever experienced over the lumbar." As to the comparative convenience of the two openings, the claim for the anterior one is more than "plausible;" it is self-evident. It may be true that firmer compression can be applied to the lumbar opening, but in most cases all the pressure needed can be applied to the anterior. In my own practice, though, the patients are usually supplied with a well-fitting truss; many find it necessary to use only a pad of lint and bandage, and keep the truss only for use when away from home. The fact is, that solid fæces cause little trouble and fluid ones will escape from either opening, in spite of almost any dressing.

In a general way it must be admitted that not all cases of colotomy, no matter by which method performed, will be equally satisfactory. A lumbar incision may in any individual case give greater satisfaction than an inguinal, and *vice versâ*.

The strongest point in Bryant's paper has been reserved till the last. It is found in this sentence: "If, then, it can be said that iliac colotomy is an easier operation than the lumbar, when the large bowel is empty, the abdomen flaccid, and the symptoms of obstruction pronounced, it can without hesitation be asserted that with a distended abdomen and colon and urgent symptoms the lumbar operation is the simpler of the two." This we believe will be admitted by almost all operators, provided only that before operating the exact seat of the obstruction is known, and that no abdominal exploration is necessary. With a distended abdomen the inguinal operation may become very complicated from the protrusion of the intestines, whereas in the lumbar incision the very distension facilitates the operation by forcing the colon into the incision.

There is one final point in favor of the inguinal opening not touched upon in Bryant's paper, probably because it has never been prominently brought forward by its advocates; and yet it is an important one, as we think he will readily admit. The artificial anus is not always intended to be permanent. The operation may bring about a cure of the disease for which it is done, or it may fulfill the indication for which it is performed in extirpation of the rectum,—that of giving greater safety and preventing fæcal

extravasation into the peritoneum. It may be done because the patient cannot bear an extirpation at the time, but, this being subsequently performed, it becomes at once desirable to close the artificial anus.

Is there any question that an opening intended for subsequent possible closure can be made with a better adaptation to that end in the inguinal than in the lumbar region?

It is a sign of the advance in medicine and a matter for congratulation that a discussion such as this as to the best method of performing colotomy should be going on. The discussion not so long ago was as to whether it should be done at all.

CLOSURE OF ARTIFICIAL ANUS.

The increasing frequency of colotomy has led to renewed experiment and investigation as to the best method of closing both an artificial anus deliberately formed by the surgeon and fæcal fistulæ resulting from strangulated hernia or other causes. For colotomy is often done simply as a measure of increased safety before the extirpation of a cancerous rectum, or as a temporary resource to facilitate the cure of otherwise incurable ulceration, as well as for permanent relief to obstruction.

Before discussing the various means of closing such an opening, it may not be out of place to mention that the operator in doing a colotomy should always be guided by a fixed idea as to whether the opening is to be a permanent one or merely a provisional one. The inguinal operation admits of much latitude as to the size and character of the opening, the prominence of the spur, and the amount of intestinal wall sacrificed. An opening may be made which can be closed by nothing short of a resection and suture, or one may answer the same purpose which can be closed by a plastic operation devoid of any danger. In cases of cancer of the rectum, recto-vesical fistula, etc., the larger the spur, the wider the opening, the better. In other cases, the smaller the spur and the less the amount of intestinal wall removed, the better, provided only that the artificial anus fulfills its purpose.

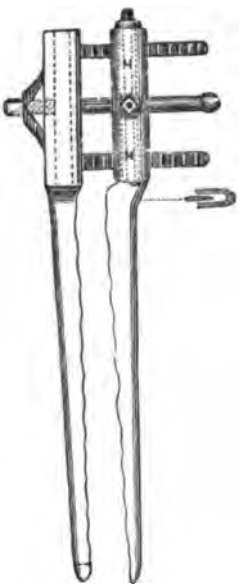
On this subject there have been several important papers during the past year,—P. Phillippe,[1003] Chaput,[14] Polaillon,[21] Goetz,[1004]—which we will consider collectively.

The general principle laid down by nearly all writers of the

present time is, that artificial anus, properly speaking,—that is, an artificial opening made by the surgeon, as distinguished from fæcal fistula the result of a pathological process,—should be treated by the enterotome and a subsequent plastic operation, and not by resection and suture. The methods differ only in minor details,—the kind of enterotome, the amount of spur to be removed, and the best method of subsequent suture.

The spur may be destroyed in various ways,—by some form of enterotome, by caustics, by electrolysis, or by amputation and suture of the two walls of gut forming the stump, so as to shut off the cavity of the gut from the peritoneum in case the latter be opened. Various forms of enterotomes are described, but nothing seems to answer the purpose better than the old one of Dupuytren.

ENTEROTOME OF DUPUYTREN IN POSITION.
(*Kelsey's "Dis. of the Rectum and Anus."*)



LÉCUYER'S ENTEROTOME.
(*Union Médical du Nord-Est.*)

Lécuyer[1005] has invented one which he believes has an advantage over the last, in that the blades are parallel.

Chaput insists that the section of the spur, to be sufficient, should measure at least 9 centimetres. The vivifying of the edges of the gut will cost at least 2 centimetres of space, and, as the breech in the spur must finally be turned into lumen of the gut, the resulting space after suture will be none too large to prevent stricture.

After destruction of the spur it will be necessary to destroy the exuberant mucous membrane of the orifice, which, if allowed

to remain, would render an accurate suturing of the intestine impossible. Next, the intestine must be liberated to an extent sufficient to allow of suture without too much tension on the stitches. This liberation has the additional advantage of rendering the intestine independent of the constant movements of the abdominal wall. The suture of the intestine must also be carefully done, and after this it is essential to put in a row of deep stitches to approximate the muscular layer of the abdominal wall, and, finally, a superficial row for the skin, both tending to re-inforce the intestinal suture and render the union more solid.

Chaput thinks the fault in the operation of Malgaigne was in an insufficient dissection of the intestine. He took no especial pains to destroy the everted edge of the mucous membrane, and this is a great omission, as this ring tends so decidedly to eversion that it prevents the formation of a proper line of suture. Care should be taken in this suture to bring the serous surfaces back to back as far as possible.

The operation in detail is as follows: The intestine is first separated from the abdominal wall and skin with a bistoury. The dissection should go to a depth of at least 2 centimetres, in order that the intestine may be sufficiently free, but it is not intended to open into the peritoneal cavity. The exuberant mucous membrane is then cut away with scissors. The muscular tissue is then vivified by cutting either with the scissors or curette for at least 1 centimetre all around the opening. The opposing lips of the intestine are then approximated by sutures, which turn the free edges into the lumen of the gut. Deep catgut sutures are next used for the muscular layer of the abdominal wall, and finally the epidermal layer of the skin is removed with a sharp curette before the last sutures are applied.

This, it will be seen, differs from the operation of Szymanowski, described by myself,[1005 p.434] as applied to the same deformity, though originally intended for urethral fistulæ, in many respects. It would seem, at first sight, the better procedure of the two, though evidently sacrificing more of the lumen of the gut, and hence necessitating the deeper application of the enterotome in the destruction of the spur.

In dealing with artificial anus established spontaneously,—in other words, with fæcal fistula,—an entirely different plan must be

followed. Chaput remarks that the characteristics of this form of fistula are, first, the divergence of the spur; and, second, the absence of what may be called the intra-parietal tract. The intestine divided by gangrene is never attached to the skin, as in the artificial anus made by the surgeon; and in the artificial anus must be added such frequent and serious complications as retraction of the ends of the intestine, change of relations, etc. Even in the most simple cases it is impossible, with the enterotome, to effect, without danger, a sufficient destruction of a divergent spur, and, moreover, the subsequent obliteration of the orifice is impossible without opening the peritoneum. For all these reasons the simplest and most logical method is to open deliberately the peritoneum and make a circular resection and suture.

Chaput practices a circular suture, which is different from the one usually done in America. He commences by destroying the mucous membrane with a curette to the extent of 1 centimetre at each end of the gut. He then makes a first row of interrupted sutures, bringing into contact the internal surfaces of the vivified muscular layer. This first suture forms a circular crest, projecting externally. The peritoneal surface is next vivified by an application of the chloride of zinc, and a second row of Lembert's sutures is inserted. When these are tightened the first row disappears in the groove formed by the second. When possible, he recommends also the circular graft of omentum.

A complication always to be met with, when the artificial anus is of long standing, is the atrophy of the distal portion of the gut so that a circular suture may be impossible from the difference in calibre of the two openings. This atrophy is constant when the distal end is not called upon for any function (and, I may add, comes on with remarkable rapidity, being strongly marked even after a few weeks). It may, however, often be made to disappear spontaneously with a few precautions. The lower orifice should be dilated with the finger and injections of milk or beef-tea made into the distal portion through a long tube every day. Every day also an enema should be given by the natural anus. In case this treatment is impossible, on account of contraction or even obliteration of the lower end, or by its retraction into the abdomen, and it is still indicated to interfere, it is well to open the peritoneum, search for the two ends, and, if the disproportion is not

excessive, regulate them by proper section and employ a longitudinal enterorrhaphy. In case the disproportion is too great, the two ends should be brought to the surface and an artificial anus substituted for a fæcal fistula. After this it may be possible to overcome the atrophy in the manner described and subsequently close the opening by circular suture.

The two latter methods, which are admirable when dealing with the small intestine, are inapplicable when the fistula involves the large bowel, as, for example, an artificial anus in the transverse colon in the umbilical region. In fact, there is never sufficient room to establish a longitudinal enterorrhaphy, on account of the shortness of the mesentery; and, on the other hand, if bringing the two ends to the skin is possible, a circular suture is equally so.

Fortunately, however, in these cases there is an advantage over those in the small intestine, for by injections of food and by enemata it is easily possible to prevent the large intestine from becoming atrophied, even when it is obliterated at the hernial opening. The only important point to know is whether, after bringing together the two ends, they can be joined by circular suture.

If this condition is not realized, a longitudinal enterorrhaphy is as impossible as would be the bringing of the two ends to the skin. There is, then, but one resource—to create a passage for the fæces by an intestinal anastomosis between the end of the small intestine and the sigmoid flexure, and obliterate each of the two ends of the transverse colon at the umbilicus, as may easily be done by abrasion and suture.

The plan of operation in cases of umbilical anus in the transverse colon should, then, be as follows: Open the peritoneum, prepare the two ends, and try and unite them by circular suture. If this is found impossible, obliterate the two ends and close the incision in the abdominal wall. A new incision should then be made in the median line inferiorly to find the end of the ilium and make an anastomosis with the sigmoid flexure.

It is easily understood that when a contraction exists in the gut below the fæcal fistula the obliteration of the latter is contraindicated until the contraction is removed. This lesion is, then, first to be overcome by resection or any other method, and the fistula subsequently obliterated in the manner shown.

It is possible, however, that the stricture cannot be overcome (cancer, stricture of the large intestine too extensive for extirpation). In these conditions it may be possible to cure the fæcal fistula, provided only that the sigmoid flexure and rectum are permeable. To do this it is only necessary to form an anastomosis, as just shown.

It is best to operate as soon as possible on a fæcal fistula—as soon as the local and general state will permit. Only inconvenience can result from delay, and the nutritive injections and enemata are indispensable to prevent atrophy of the distal portion of the gut.

Incidental to this recommendation of Chaput, that end-to-end suturing be practiced whenever possible, it is of interest to note the work of McGraw[185] in this line. After detailing a successful case of resection with end-to-end apposition without rings or plates, the author enters into a very suggestive discussion of Senn's methods.

In his own case he excised about three inches of the bowel, cutting it obliquely to its long axis, and removing more of its free than of its attached surfaces. The ends of the gut were then brought together with a double row of sutures of fine silk, one for the mucous membrane and one for the muscular and serous coats, and the seam tested by forcing the contents of the bowel through the repaired portion. The union was sufficiently tight to prevent leakage and the bowel was returned into the abdomen.

As compared with lateral anastomosis, the end-to-end suture appears to McGraw to be preferable, for the following reasons: The direct union of the divided ends makes the most direct and unobstructed passage possible. The union by anastomosis makes a canal which has a decided bend, with an inevitable, even though slight, obstruction at the point of union. Our experience, as regards the ultimate results of such unions, is too limited to enable us to form any correct idea of the dangers which may arise from such persistent abnormal relations.

The author does not say that any such dangers would arise—simply that we do not know as yet whether they would or not. If, in making an intestinal anastomosis, a portion of the bowel is excised and the ends turned in and sewed up, the subsequent union by anastomosis will leave two blind pouches similar to the cæcum,

one on each side of the orifice of communication. Now, if trouble arises sometimes in the cæcum from fæcal accumulation and impaction, how much more likely would it be to arise from abnormal pouches, which would not be so favorably situated for evacuating their contents as the cæcum.

If, in making an intestinal anastomosis, the bowel were not excised, there would be left a portion of the gut of greater or less length, which would be left practically without function, and at the same time be temporarily or permanently obstructed in some point in its continuity. What might be the final fate after months or years of such a degraded bowel no man is in position to say; nor can we, as yet, reckon the chances of the occurrence of acute obstruction in the loop of intestine thus abnormally united and dragged out of place. The vermicular motion of such a gut must of necessity be interfered with. So, also, the free motion of the intestine within the abdominal cavity—a motion very necessary to intestinal health, as it permits the bowel, by changing its position, to adapt itself to the ever-changing condition of its contents.

McGraw also calls attention, on theoretical grounds, to what, we may add, has been found the case in actual practice—the cicatricial stenosis of the anastomotic opening.

As regards the operation of intestinal anastomosis, the one great superiority claimed for it over other methods of uniting divided intestine is the rapidity with which it may be executed. The author has made a large number of experiments on dogs, in order to determine the relative rapidity with which these various modes of operating may be carried out, and has found, taking one case with another, that the operation of intestinal anastomosis, with division of the gut and inversion of the ends, takes, from the moment when the gut is divided to the moment when the operation on the gut is completed, about twenty minutes; that of intestinal anastomosis, without previous division of the gut, about fifteen minutes; that of end-to-end suture, with double row of sutures, about twenty-five minutes, if he uses interrupted sutures, and about eighteen minutes with continuous sutures.

The mesentery is first sutured at its junction with the bowel, where there is a triangular, raw surface of considerable size. Then, beginning at one side of the mesentery, a continuous suture is run around the edge of the mucous membrane, carrying it first toward

the mesentery. It is possible to sew the mucous membrane together from within the gut for the first half of its circumference, and after that the needle must be carried around the internal mucous membrane from without. When the whole mucous membrane has been joined together, with inturned edges, by a continuous suture, then the serous membrane is united by a continuous Lembert suture, beginning at the mesentery, until the mesentery is reached on the opposite side.

In this way we have a double row of sutures around the gut, one uniting the mucous and the other the serous surfaces. The outer row, it is true, does not completely encircle the gut, as it is broken at the insertion of the mesentery; but the suture of the cut mesentery, with its broad, raw surface, practically completes the row, as its surfaces will unite as quickly and firmly as the serous surfaces of the gut itself.

Briggs[100 July] also gives directions for covering the line of suture with a graft of animal membrane.

In enterectomy, for example, the membrane may be taken from any of the serous surfaces of a recently slaughtered animal. Bullock, sheep, and hog membranes have been used with equally good results. The membrane is taken from a 4-per-cent. solution of carbolic acid in which it has been resting, and applied to the intestine so as to cover the sutured ends, and stitched to the mesentery by a few light sutures of the finest catgut. In the course of three or four hours a remarkable change will be seen. The membrane, which, when applied to the intestine fitted loosely and irregularly, will be found lying taut and smoothly stretched over the surface with which it has been in contact, and so closely and firmly united to it at every point as to form practically a part of the intestinal wall. Its physical appearance has also undergone a change; from the flabby, dead look which it had when first applied, it has assumed a living appearance, and its edges have been smoothly beveled, so that, except for the difference in color, it would be almost impossible to discover the line of juncture.

Robinson[1 Oct. 15] also gives more minute directions. He says the surface of the graft and the surface to which it is applied should be scarified with a needle-point and held in position by a few sutures. The grafts should be large enough to completely cover the whole ground. If the wound be extensive, more than one graft may be

applied. Grafts 2 by 4 inches live well and attain remarkable vitality. The grafts are best obtained from the omentum and may be used in two ways. One is to apply the omentum (the edge or any part) around the parts operated on, fix it in position with sutures, and leave it unsevered from the omentum, not cutting it away from its original attachments.

The objection to raise against this method is, that it will make an arch under which intestines will slide to and fro, and may become herniated. This may happen, but in one hundred and fifty post-mortems by the author it never has happened—the autopsies being made from one to eighty days after the operation. This method of graft application is very certain in its healing, and many times the author has found distinct fæcal fistulæ which were arrested by the thickened graft. In these cases the graft is absolutely the means of saving life.

The other method of using peritoneal or omental grafts is to completely sever them from some part of the peritoneum or omentum, and then apply them over the part and fix them by a few sutures. The author has successfully applied grafts from the omentum, 3 inches by 5, without any sign of loss of vitality. If omental grafts are used they should be taken from the edge (cut or torn), and not from the centre or interior. This was done a few times, tearing an omental graft out of the interior of the omentum, leaving a hole varying from 2 inches by 4 to 3 inches by 6 in this membrane. In 1 case of gastro-enterostomy an aperture was torn, and at the autopsy, two weeks later, 6 or 8 feet of small intestine were found prolapsed through the hole in the omentum. The edges of the aperture had become rounded and thickened, and might have strangulated the prolapsed intestine at any moment from mechanical or pathological causes.

EXTIRPATION OF CANCER OF THE RECTUM.

Routier[91] Dec. 10, '99 reports a case which illustrates exceedingly well the advantages of Kraske's method of resection, and also reviews the whole subject with clearness.

The patient, a woman of 29 years, believed herself suffering from uterine disease, on account of the pelvic pain. The examination was at first negative, until, by careful vaginal touch, a tumor, analogous to that caused by a collection of fæces, was felt high up

posteriorly across the pelvic *cul-de-sac*. By rectal examination a mass could only just be felt with the tip of the finger, completely surrounding the gut and constricting it. The lower border of the tumor was 12 centimetres above the sphincter, and the upper border could not be reached.

The patient was purged several times with castor-oil, put upon absolute milk diet, given each day 2 grammes (31 grains) of naphthol, with an equal quantity of salicylate of magnesia. In a few days the stools were inodorous and resembled those of a child nursing. Ten days after entering the hospital she was purged for the last time, and on the day following the operation was performed.

In the right lateral position, the rectum was first thoroughly irrigated and the skin well cleansed. The incision was on the left of the sacral crest and parallel with it, starting from the level of a line uniting the two posterior iliac spinous processes and ending a little above the tip of the coccyx; that is, about 5 centimetres from the anus. The coccyx and lower part of the sacrum were denuded; the coccyx was disarticulated, its periosteum being preserved in order to save, as far as possible, the attachments of the fibrous tissues of the raphe; the first piece of the coccyx remaining in place was cut across with bone-forceps and the left salient angle of the sacrum was gouged out, no nerve-trunks being encountered. In this way the lower limit of the cancer was reached. The rectum was easily separated from the anterior surface of the sacrum with the finger, but with more difficulty from the vagina. During these manipulations the peritoneal *cul-de-sac* was opened and tamponed with a sponge. After the opening of the peritoneum the gut could easily be drawn down. The rectum was ligatured with strong silk above and below the disease, and a provisional ligature was passed through the mesorectum and given to an assistant, to prevent the upper end being lost by retraction after section. The cancerous portion was then resected, both ends were plugged with iodoform cotton, and the parietal peritoneum of the *cul-de-sac* was united by a fine catgut suture to the visceral layer of the rectum. In this way all the remainder of the operation was extra-peritoneal, and this consisted in suturing the two ends of the gut with a double row of silk sutures around the whole circumference. A few sutures were used to diminish somewhat

the external wound, and the part left open was stuffed with iodoform gauze. The operation required two hours, much time being spent in separating the rectum from the vagina. On the following day gas was passed per anum, and the patient made a rapid recovery, being only retarded by violent iodoform poisoning, which disappeared when the iodoform was replaced by salol. On the seventh day there was a natural stool.

The sphincter acted well and the sutures accomplished their purpose, but two days after there was a slight fistula behind, which at the time of the report bid fair to close spontaneously. This did not prevent the patient from getting around, and she was able to leave her bed about twenty days after the operation.

One such case as the above goes a long way. It is not an amputation with the disadvantages of which, in the way of incontinence, and with the statistics and advantages with which all are familiar; but a circular resection and suture exactly analogous to what may be done in the abdominal cavity. It opens up a new field of work, in that it completely sets at defiance the rule of the conservative surgeons that only such cases of cancer of the rectum should be operated upon as are within reach of the finger and freely movable. For here we have a case (not by any means a single one) where the disease was so high up that only its lower edge could be felt by the finger, and its upper limit could not be determined at all before operation.

Kraske's operation, it must be always remembered, is based on this one idea—the removal of disease too high up to be reached by the old method of amputation and too low down to be reached by laparotomy. It brings into the field of surgery just that part of the gut between the limit of digital examination per rectum and the part of the sigmoid flexure that can be handled through an abdominal incision. It curtails the field of colotomy enormously. The objection to it has been its mortality. Naturally this will be decreased with constant improvement in the technique; and even if it never be decreased, it must be looked at from the point that we are dealing with a fatal disease for which we have no other treatment except the palliation given by colotomy.

Since Kraske's first article, in 1885, many modifications of the original operation have been noted in the ANNUAL, one or two of which have improved it almost out of existence by simply

changing it into a prolongation of a posterior proctotomy and amputation, forgetting that one of the great advantages of the true Kraske incision is the preservation of the sphincters uncut. Kraske opened the peritoneum boldly, and only sutured the anterior two-thirds of the circumference of the gut.

Bardenheuer in 1887 substituted a transverse section of the sacrum for the lateral one of Kraske, and recommended stripping the peritoneum off the rectum in place of boldly opening into it.

In the same year Kraske published 8 cases of operation by his method. He had tried complete circular suture, but two deaths from peritonitis caused by fæcal extravasation led him to abandon it, provising, however, that he should try it again if by purgatives and enemata he could succeed in completely emptying the bowels. He might also do a provisional colotomy to secure complete asepsis of the sutured portion.

Schede carried the operation to its greatest perfection. He immediately closed the peritoneal wound by catgut sutures, refrained from opening up the rectum between the sphincter and the cancer, and completely sutured the two ends of the divided intestine. Unfortunately, in his first case a part of the intestinal suture gave way, and thus in his two others he felt it necessary to form a provisional artificial anus in the colon.

In 1888, Heinecke, in a criticism on the method of Kraske, lays down the conditions which should be fulfilled. These, according to him, are the preserving the solidity of the pelvic plane, the possibility of applying complete antisepsis, and the preservation of the function of the sphincters. His plan of accomplishing these ends consisted in first doing a posterior proctotomy up to the lower limit of the disease. The disease being excised, he enforces the necessity of drawing the upper end of the gut forcibly downward and stitching it to the skin of this incision, establishing thus at the outset a sacral artificial anus—the curve of the intestine thus obtained being sufficient, according to his idea, to do away with the necessity for closing the peritoneal *cul-de-sac*. As a final step in the operation, he proposed a large autoplastic operation to close the sphincter and the lower part of the rectum unnecessarily divided.

The danger of disturbing the solidity of the pelvis, which was the chief idea in this method, was at once shown to be

hypothetical by the report of a case by Lihotzky, in which a woman previously operated upon by him by the Kraske method had been delivered of a large child, the rotation of the head occurring normally in spite of the absence of the sacrum and its ligaments.

Hochenegg in 1888 reported 12 cases operated upon with good results. He did not close the opened peritoneum, and did not commit himself as to the best method of acting after the resection of the cancerous mass. His great modification consisted in the suture of the mucous membrane to the skin, establishing thus a sacral artificial anus; though he admits that the complete circular suture may be performed if great care be taken to empty the alimentary canal before operation. Otherwise, a provisional colotomy should be performed.

Relying on the number of cases which he had observed, he concludes that the method of Kraske is the preferable one for treating cancer of the rectum. But in cases of ano-rectal cancer he thinks the sacral artificial anus preferable to either the lumbar or the inguinal,—a conclusion, we may add, which he has the honor of holding alone.

Another modification, having for its object the preservation of the bony parts, is that by Lœvy, by which he simply cuts the sacrum across with a saw, turns it down, operates on the rectum, then turns back the osseous and musculo-cutaneous flaps and sutures them. The technique has been previously described.

Roux has twice practiced the operation of Kraske, with a temporary osseous resection, lowering his flap on the right side. Hégar and Wiedow, in applying the operation of Kraske to the ablation of the internal genital organs of women, also make use of a temporary osseous resection.

Attention is called to one great advantage of the Kraske incision in this article, which we have never seen elsewhere in print, though well appreciated by those familiar with the operation. It is the facility with which infected glands in the mesorectum and peri-rectal cellular tissue may be extirpated at the time of the operation, as can be done by no other method.

Another point called into prominence is that it is not necessary to remove any great amount of bone-tissue. In the author's case, the removal consisted only of the coccyx and a small fragment of the sacrum forming its left inferior angle. This makes a suffi-

ciently large field of operation for the removal of growths reaching a long way up the gut.

The operation is applicable also to other diseases than cancer of the rectum. Bardenheuer (and also the editor) have applied it to the closure of recto-vaginal fistulæ situated so high as to be out of the reach of the other operations. Hochenegg has tried it in congenital malformations of the rectum and in prolapsus.

Schede, Hégar, and Wiedow have in this way opened abscesses of the pelvis arising either from the vertebræ or the genitals. They also, with Czerny, have been able to easily extirpate the uterus by this plan with much greater safety than by the vagina. The author does not attempt to decide upon the value of this modification. In all the cases, no matter what special modification of the incision was made, it is easy to reach the uterus by the sacral method; it is possible to see what one is doing during the whole of the operation, as much of the utero-sacral and broad ligaments is removed as the operator wishes; these are tied and, after closing the vaginal opening by a suture, the peritoneum is entirely closed.

PROLAPSE OF THE RECTUM.

The difficulty and sometimes the impossibility of curing severe cases of prolapse by the ordinary operations recommended in the text-books is well known. It not infrequently happens that the cautery has been applied again and again without giving more than temporary relief, the mucous membrane re-appearing almost as soon as cicatrization has taken place. This refers especially to the second and third forms of prolapsus where there is an actual invagination of the rectum with the prolapsus, and the tumor contains a fold of peritoneum either in front or all around.

The operative treatment of these cases has attracted considerable attention during the past year and several successful cases have been reported.

The operation of Mikulicz (ANNUAL, 1888) consists, after disinfection of the parts, in making an oblique incision 3 centimetres long, just below the anus, through the entire thickness of the outer portion of the intestine, and securing the cut edge of the peritoneum to the peritoneum of the inner portion with Lembert's suture. In this way the entire prolapsed portion is encircled and then amputated by an incision just below the sutures. The edges

of the mucous membrane are then united by interrupted silk sutures and the stump returned above the sphincter.

The operation of Kleberg consists in pulling down the prolapsus as far as possible and in making sure that it contains no hernial contents, or in reducing them if present.

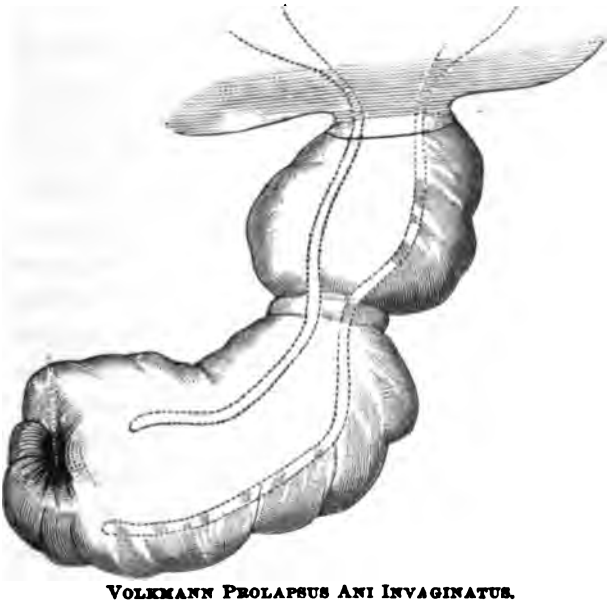
The assistant then surrounds with all his fingers the prolapse from above, the points of the fingers being directed toward the free end of the prolapse and pressed as hard as possible into the gut just below the sphincters. Immediately in front of the fingers the tumor is then encircled with an elastic ligature drawn sufficiently tight to control the circulation. The assistant's hands are then released and the operation performed with antiseptic precautions. A few lines below the elastic ligature a longitudinal incision is made, 2 inches long, opening into the sac formed by drawing down the peritoneum. Being sure that the sac contains no loop of intestine, a trocar is plunged through it, from before backward; two elastic ligatures are by this means carried through the tumor and the mass is tied off in two sections. The temporary ligature is then removed, the prolapsus amputated below the sutures, and the stump replaced.

It will be seen at once that the former operation has many advantages and the successful cases of the past year have all been modifications of this procedure. Volkmann[4] reports 2 cases, in 1 of which there had been sloughing and subsequent stricture,—the whole mass being amputated on the level with the sphincters, as shown in the cut.

Treves[6] reports the following method: The rectum having been well emptied by an aperient followed by an enema, the patient was placed in the lithotomy position and held by Clover's crutch. The buttocks were well raised, partly for convenience and partly to allow the small intestine to fall away from the peritoneal pouch contained in the prolapse.

The first step of the operation consisted in demonstrating the extent of the prolapse. The mucous membrane within the lumen of the tumor was seized, at some height above the aperture of the bowel, with tongue-forceps and pulled down. Three pairs of such forceps were employed at different points of the rectal wall; and when it was evident that the whole of the relaxed mucous membrane was entirely drawn down, the forceps were allowed to remain

attached. They served to indicate the real apex of the protrusion and to allow a hold to be taken of the part, while their weight prevented any great recession of the everted mucous membrane. A circular cut was then made around the base of the prolapse at the exact spot where the skin joined the mucous membrane. The incision involved the mucous membrane only. The mucous membrane was next dissected off and turned down all around like a cuff. It was dissected up entirely with scissors and forceps only. When the separation was complete the prolapse had an hour-glass shape, the waist of the hour-glass corresponding to the apex of the



VOLKMANN PROLAPSUS ANI INVAGINATUS.
(*Berlin. klin. Wochen.*)

protrusion. Nothing but a raw surface was visible, and the prolapse was, of course, doubled in length. The bleeding was quite insignificant. The object of this dissection was to clearly demonstrate the nature of the tissues composing the prolapse and which were about to be excised. The external sphincter, much hypertrophied, was now exposed; and within it the internal sphincter could be defined. The operator next introduced his left forefinger into the prolapse and ascertained that the protrusion was composed of mucous membrane only. This layer of mucous membrane—the inner one—was next divided at the level of the anus with scissors. As each inch or so was divided the cut margin was

seized with pressure-forceps, thus allowing the immediate arrest of all bleeding and preventing the mucous membrane from slipping up into the rectum. The prolapse was in this way completely excised and six or eight pressure-forceps left attached to the cut edge of the mucous membrane. These were removed, vessels ligatured, and the mucous membrane stitched to the margin of the skin with silkworm-gut. Eight bleeding vessels were ligatured and fifteen silkworm-gut sutures applied.

It will be noticed that this was a simple case of prolapsus of the first variety, consisting of mucous membrane alone,—a form generally curable by Van Buren's method of linear cauterization, or else by free use of the clamp and cautery. Another case, reported by the same writer, was of a much more serious character. The patient, a sailor, aged 36, had an enormous prolapse, descending with the least cause, and only with great difficulty kept up at all. He complained of distressing tenesmus, loss of control over the anus, the escape of bloody mucus and fæcal matter, and great irritability of the bladder. Defecation caused him great distress, the stools being "like lead-pencils," which he had to squeeze out of the tumor with his hands. The prolapse was conical and covered with healthy mucous membrane. The base measured 10½ inches in circumference and the length was 5 inches. When the prolapse was reduced the size of the anus appeared enormous. It remained open, and showed little or no disposition to contract. The lumen of the prolapse was very small and contracted, and would only admit the finger. When the prolapse had been reduced, and then examined with the finger in the rectum, it felt like a large, soft, foreign body, with a central tube made of cartilage.

The operation was commenced as in the previous case. The mucous membrane forming the outer covering was prepared for separation around the entire base of the cone, the knife traversing the skin close to its line of junction with the mucous membrane. The tunic was then separated from the prolapse by the scissors, aided by traction, and was everted down to the apex of the cone, as in the previous case. The protrusion, quite bared of mucous membrane, was now exposed. It felt hard and firm, except at the anterior part close to the anus. Here there was evidence of a protrusion of peritoneum. The wall of the cone was at this point flaccid, and compared very markedly with the firm wall presented

by the rest of the prolapse. The buttocks had been well raised to prevent the protrusion of any coil of small intestine, and no evidence of such protrusion existed. The prolapse was then cut across at the level of the anus; that is, at the very base of the cone. The anterior wall was first divided and the peritoneum opened, the opening being plugged with a sponge. The rest of the prolapse was then severed rapidly with scissors. The cut end of the bowel, muscular coat, and mucous coat together was seized with pressure-forceps in the manner already described. It was thus held in position, was prevented from retracting, and all bleeding points were secured at once. The small plug of sponge being removed, the peritoneal wound was closed with six or seven sutures of the finest chromicized catgut. The divided end of the bowel was next attached to the margin of the anus. The sutures involved the whole thickness of the wall of the rectum and as much as possible of the subcutaneous tissue about the anus. A suture involving merely the skin and the mucous membrane would obviously not have met the needs of the case. As the pressure-forceps were removed to prepare each segment of the divided rectum for fixing in place, any bleeding point made evident was ligatured, the suture material being silkworm-gut.

The bowel had been divided above the greatly-thickened and hypertrophied part which formed the prolapse, and the segment attached to the anus was thin and in every respect normal. The anus, as it appeared at the time of the operation, was of immense size. The external sphincter appeared as a quite considerable ring of muscle. The part removed measured 5 inches in length, and upon its anterior surface was nearly 3 square inches of peritoneum. Although the mucous membrane was represented by a double fold, one covering the outer surface of the prolapse and the other lining its lumen, the muscular tunic was represented by only a single tube. The internal sphincter formed the apex of the protrusion, and thus it happened that 4¾ inches separated the external sphincter from the internal. The muscular coat of the rectum had descended bodily, and had carried the mucous membrane before it. It had not been turned "inside out," but had been prolapsed precisely as if it had been a solid organ like the uterus. It is hardly necessary to point out that, structurally and morphologically, the two sphincters are quite distinct; they are

developed separately from separate embryonic parts. The internal sphincter had in this case formed the apex of the protrusion, just as the ileo-cæcal valve forms the apex of the ileo-cæcal form of intussusception. There was no suggestion of any stricture of the part removed. The patient recovered rapidly, without a bad symptom.

Referring to subcutaneous injections, the application of nitric acid, linear cauterization, and the removal of parts of the tumor with the clamp and cautery, Treves indulges in the following criticism: "Of all these methods it may be said that they are clumsy, uncouth, uncertain, and unsafe; that they are not in accord with the teachings of modern surgery, that they offer the least satisfactory mode of dealing with the affection, involve a protracted and painful period of treatment, and incur unnecessary risks."

If the lamented Van Buren could only hear his lightly-applied linear cauterization of a child's rectum characterized as an "unnecessary risk," as compared with a resection and circular suture of a gut covered with peritoneum!

Treves again says: "The application of the actual cautery to the mucous membrane of the prolapse, or the removal of linear folds of that membrane by means of the clamp and cautery, are measures which are little superior to that just described (nitric acid). The treatment is painful, a severe degree of inflammation is excited, sloughing is inevitable, the special dangers of a burn are introduced, and more or less cicatrization is unavoidable." To begin at the end and work backward, we might answer that the unavoidable cicatrization is fortunate, since upon it the cure depends. We might ask what are the special dangers of a burn, and add that the sloughing is the necessary antecedent of the cicatrization which cures. He also says: "During the use of the clamp and cautery the weakened bowel has given way and coils of small intestine have escaped." In one case this accident did happen (as it may to him some time when his sutures fail to hold), but the gut was at once replaced, and the patient made as good a recovery as in the case he has just recorded.

The operation of exsection is a good one (not at all original with Treves), but we supposed all were agreed that it was specially adapted to prolapsus of the third variety, containing peritoneum, which milder procedures had failed to cure. Are we to understand

that the author advises it in preference to all other procedures in all cases, great or small, old or recent?

McLeod[6 July 18] has certainly carried out a novel and original method of curing old prolapsus. In few words, it consists in introducing the left hand into the rectum up to the abdominal cavity, holding the gut against the abdominal wall and suturing it there. The suture used was an elaborate one, which it is unnecessary to describe in detail, for to put it into effect will seldom be found possible. The operation was a curiously ingenious one, and successful. Keen[144 May] reports a successful case of amputation; Gross (of Nancy) reviews[3 Feb. 12] the whole history of the various operative procedures in an interesting article; Syot[1006] has made it the subject of a thesis; and Cripps[6 Oct. 11] goes over the old ground, but calls particular attention to the treatment of invagination of the upper part of the rectum into the lower without prolapsus. His treatment is the same as Van Buren's for ordinary prolapsus, except

CAUTERY-IRON.

that he uses the old-fashioned cautery-iron shown in the cut, heated to a black heat. As I know by experience, this condition is a difficult one to diagnosticate, but I have twice done so, and once have followed the suggestion of the author with good result. A word of caution against using too hot an iron so far up the rectum may not be out of place. A periproctitis is easily excited in this part, and may easily be fatal.

Roberts[96 Apr.] describes a case in which he cured an old prolapse by the following method: "Making a small incision in the middle line near the point of the coccyx, I introduced my finger and broke up the cellular connections behind the rectum, as is done in preparing to excise its lower end for carcinoma. The sphincter muscle was then divided in two places by incisions situated each about half an inch away from the posterior median line. By carrying these incisions obliquely backward through the skin until they met at the original incision near the tip of the coccyx, I included between them a triangular portion of tissue which had as its base about one inch of the sphincter. With scissors I then cut from the posterior wall of the rectum a long, triangular piece,

consisting of the entire thickness of the wall. The apex of this V-shaped section was situated about three inches up the gut, while its base corresponded with the space between the incisions by which one inch of the sphincter muscle was removed."

SPONTANEOUS RUPTURE OF THE RECTUM.

Masimoff [851 Apr.] reports another case of rupture of an old and extensive prolapse of the rectum with subsequent hernia of five feet of small intestine. All operative treatment was refused, and the protrusion was simply reduced, the patient dying on the second day. The author, in discussing the case, recommends an immediate abdominal section with reduction of the hernia and closure of the rent, which is theoretically all very well, but might be practically attended by insuperable mechanical difficulties. His search through international literature leads him or his reporter to the mistaken statement that only 4 such cases are known. He has not seen the papers of Englisch and Quénu, nor the analysis[1005] of reported cases up to date in the last edition of my work.

MISCELLANEOUS.

Terrier [91 Nov. 10, '89] describes an interesting case of diverticulum of the rectum in which he effected a cure by the excision of the abnormal portion.

Baudouin, [73 Aug. 30] in an interesting article, gives minute directions for securing rigid antisepsis of the ano-rectal region and alimentary canal before, during, and after surgical operations. The preparatory treatment consists in ten days of mild purgation, with absolute milk diet and 10- to 20- centigramme ($1\frac{1}{2}$ to $3\frac{1}{10}$ grains) doses of naphthol β; 1 gramme (15 grains) per diem will generally suffice, and may with advantage be combined with sulphate of magnesia. Antisepsis during operations is sufficiently understood. After the operation he recommends the rubber tube surrounded with gauze and frequent antiseptic enemata.

In my report of the first year's work in diseases of the rectum at the New York Post-Graduate Hospital, [9 Dec. 6] I have related some rare and curious cases which may be of interest to readers devoting thought to this subject. The 67 operations done before the class included 6 colotomies and 3 excisions, and the interesting cases are reported in detail.

SURGICAL DISEASES OF THE GENITO-URINARY APPARATUS IN THE MALE.

By E. L. KEYES, M.D.,
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The journals of 1890 maintain the standard of general interest in minor matters connected with genito-urinary surgery, as in 1889, mainly in such particulars as deal with detail of old methods and in reports of interesting cases and collections of cases. No new era has been inaugurated nor any special revolution in old methods. A strong undercurrent is evident of a tendency to apply antiseptic methods to the surgery of the regions in question. The supra-pubic method, as applied to bladder surgery, and litholapaxy, as adapted to the removal of stone from the bladders of male children, have scored new triumphs.

DISEASES OF THE PENIS.

Dislocation.—Malinovski $_{\text{Apr.19}}^{6}$ records a case of this rare injury, the penis being dislocated into the scrotum by mechanical violence. Four months later the organ was liberated and re-clad with its own integument, patched out with scrotum. The power of coition returned.

J. B. Field $_{\text{Apr.94}}^{2}$ encountered a dislocation of the penis and both testicles under the abdominal integument above Poupart's ligament. Primary reduction was accomplished, but the patient died of his various other injuries.

Dislocation of the testicle into a position under the integument on the left side of the body of the penis, in which no attempt was made at reduction, is reported, with a wood-cut, by E. B. Howlett, $_{\text{Sept.19}}^{2}$ and a traumatic separation of the epididymis from the testicle by Charles H. Bedford. $_{\text{Oct.25}}^{2}$

Mucous Cyst of the Prepuce.—P. Redard $_{\text{Mar.}}^{118}$ records, with extensive illustrations, a case of this unusual malady.

Amputation.—H. Keller 96 Oct. brings forward a new treatment of the stump after amputation of the penis, which seems promising. "Both corpora cavernosa are united by deeply-lying, transverse, catgut sutures," after ligating the dorsal, profunda, and bulbo-urethralis arteries, "in such a way that the two cut surfaces are in apposition and the tunica albuginea of both cavernosa are in contact in front. Then follows a second vertical row of stitches, drawing together the external skin of the penis over the sutured cavernosa stump." Oozing is thus controlled.

Circumcision.—E. R. Palmer, of Louisville, 9 Aug. 1, raises a new practical point in stating that simple dorsal incision in the infant is better than circumcision, in that it is less troublesome to the surgeon and to the child at the time of operation, answers all therapeutic indications, and because when adult life is reached atrophy of the unused cover insures as well finished an organ, æsthetically, as if ablation of the foreskin had been performed.

THE SCROTUM.

Scrotal Pneumocele.—Verneuil 3 Feb. 26 makes two classes of scrotal pneumocele: 1. Benign aërian, subcutaneous, or serous pneumocele, due to injury, (*a*) local [trocar or other puncture]; (*b*) remote wounds of air-passages and neighboring cavities of the head and neck—intestinal wounds. 2. Malignant bacterial pneumocele, due to phlegmonous inflammation implicating or near the genitals.

The benign class get well spontaneously or by puncture. The malignant are grave and call for energetic measures,—incision, drainage, disinfection, and sometimes castration.

Hydrocele.—E. von Winckel 761 B.A. H.9; 157 Aug. reports 90 cases. Forty-eight were treated by iodine injection. Cure on the average, seven to eight days. Six relapsed. Of 25 treated by radical incision, 1 relapsed.

Retained Testicle.—Orchitopexy, as a question, seems for the present, as far as the society of surgery in France is concerned, to be settled. Tuffier presented an admirable little paper, 100 Mar. 29 reaching conclusions as follows:—

It is justifiable to interfere in cases of retained testicle after the age of 15, if there appears no tendency toward spontaneous recovery, it being well known that the testicle, in many instances, descends spontaneously before this age.

If adhesions are moderate, massage and a couple of silk sutures passed through the scrotum and through the bottom of the gland (which does no harm to the testicle) and a bandage may suffice. Otherwise the vagino-peritoneal canal (or its vestiges if it is obliterated) is to be excised by dissection, the testicle brought down and fixed by a thread to the bottom of the scrotum, and the cord is also to be sutured with silk to the pillars of the ring; hernia being treated radically if it exist.

In the discussion, doubt was expressed as to the value of the ectopic testicle, but this value was affirmed by many.

A claim was made that the subsequent retraction of the testicle was due to an imperfect loosening of the tissues about the cord at the time of operation. The fibrous adhesions must be very thoroughly done away with, the cremaster destroyed,—indeed, pretty much everything except the vas deferens and spermatic artery,—the sero-peritoneal sac being entirely dissected away, a piece, perhaps, being shut in below to make a tunica vaginalis.

All agreed that the best way to make a bed for the testicle in the rudimentary scrotum was to bore out one with the finger, most of those taking part in the discussion agreeing that if the testicle were thoroughly loosened above it need not be sutured into place below, and that if not sufficiently loosened above it would finally retract, in spite of any amount of suturing below. All agreed that the ectopic testicle should not be interfered with before puberty.

These views are sound. I have, in more than one instance, cured this condition and its accompanying hernia by commencing in babyhood, and manipulating the testicle (often a difficult matter at first) to the outside of the ring and retaining it there with a truss. When early manipulation fails, it is proper to wait until puberty and then operate as above.

THE SEMINAL VESICLES.

E. Ullmann [336 Feb. 22] reports the first case, a 17-year-old boy, of successful extirpation of the seminal vesicles. Both vesicles and the right vas deferens were removed by the prerectal incision advised theoretically a year ago by Zuckerkandl (see ANNUAL for 1890, this department), the rectum being detached from the prostate. The right testicle had already been removed. The patient

got well, with a perineal fistula, which, however, did not give passage to urine. The propriety of this operation may be questioned. It would hardly be undertaken except for tubercle, and total removal of the tubercular material by this method would be difficult or impossible. It undoubtedly was not all removed in this case, or there would have been no resulting fistula.

DISEASES OF THE URETHRA.

Antisepsis of the urethra is often spoken of, both in special articles and in connection with other subjects, mainly carried out by cleanliness, hot-water irrigations, heating and disinfecting instruments, boracic-acid lotions, and boracic acid, borax, or salol administered internally.

The Gonococcus.—The fight goes on. Strauss[2] speaks of the boy of 16 who had never known woman, but had severe purulent urethral discharge (said to be due to excessive masturbation), full of perfect gonococci. Probably it is as well to take the story of this French boy of 16 and his gonococci with several grains of salt. Rollet, of Lyons,[3] reports, in the name of Eraud, of Lyons, that every urethral canal in health possesses a staphylococcus identical with the gonococcus and capable of producing "*sous l'influence de conditions à nous encore inconnues*,"—a blennorrhagic infection; but if the "conditions" were better "*connues*," perhaps the explanation would be easy.

Gonorrhœa.—J. Ernest Lane,[6] observing 50 cases of gonorrhœa treated by salol, noticed in 15 no change either way; 5 got worse. When improvement showed itself, it did so in from two to seven days. Improvement, when marked, was seen in the diminution of pain and the quality of the discharge. Injections were sometimes used coincidently. Lane thinks that 10 to 20 grains (0.65 to 1.3 grammes), three times a day, is the proper dose. Thirty grains is too large a dose. J. William White, of Philadelphia,[9] adds his testimony in favor of salol, but he uses it in conjunction with copaiba and cubebs. Salol as a urethral antiseptic seems to have been first advocated in the *Gazette hebdomadaire de Médecine et de Chirurgie*, January 4 and 10, 1890.

Pyoktanin, 1 in 1000, is spoken of[82] among the new remedies for gonorrhœa. I have tried it and do not like it. Berkeley Hill[645] gives some excellent endoscopic views of chronic urethritis,

and Gabriel,[69 July 24] E. Finger,[84 Jan. 26 et seq.] and Jadassohn,[69 June 19, 26] have contributed excellent studies upon chronic urethral inflammation. In the matter of treatment of gonorrhœa, Kopp[357 May 16] digests his experience and that of eighty different papers on the subject, of recent date. He thinks Haussmann's prophylactic injection impracticable, Welander's frictions with cotton and immediate penciling of the fossa navicularis with 2-per-cent. silver solution of uncertain value, and Diday's 10-per-cent. solution dangerous. He advises antiseptics, disbelieves in sandal-oil at any stage, does not like sublimate, and thinks thallin worthless; finally, advocating the repeated use of mild solutions of nitrate of silver without internal medicine. Verily, where shall faith in medicine or in authority be found?

The treatment by nitrate of silver again receives prominent mention at the hands of Malécot,[24 Mar. 16] who advocates a strength of 1 in 50, the next day 1 in 100 or 1 in 150. He uses salicylate of mercury as an antiseptic between the stronger injections. The salicylate of mercury is praised by others. Friedheim[45 Nov. 4, '89; 41 Oct. 16] uses 1 in 270. Friedheim gives his experience in Neisser's clinique, and thinks sublimate injections, 1 in 2000 to 4000, most effective. Diday again defends the nitrate of silver in the abortive treatment of gonorrhœa,[211 May 28] but he uses it also in the frankly purulent stage, proportioning the time the injection is to be retained to the intensity of the malady. He uses always 1 gramme (15 grains) of nitrate of silver to 20 grammes (5 drachms) of water. If the pain becomes *intense* on making the injection, Diday says it should only be retained fifteen to twenty seconds. If not, the injection should be retained about two minutes. He claims that pain, quite severe pain, is an essential to success, and, if the pain is not great enough or ceases too soon, he does not wait a day or two, but immediately gives another injection, more prolonged, and thus, he believes, accomplishes his result.

Pyæmia complicating gonorrhœa, coming on in one week, nothing having been done to arrest the discharge, is put on record by F. L. Classen, of Albany.[216 Mar.]

URETHRAL INSTRUMENTS.

R. W. Stewart, of Pittsburgh,[1 May 12] has devised a new universal bulbous bougie and an internal urethrotome, which works automatically, after being set, so as to cut strictured and not unstric-

tured parts. Its mechanism is ingenious,—too ingenious,—for it will lead to still further useless urethrotomies. Its practical utility, however, may be great. Time will show.

STRICTURE.

Electrolysis is still a burning question (often, alas! literally so) at the hands of many writers of Germany, France, England, and America. F. Swinford Edwards [2 Dec.21,'89] and W. Bruce Clarke, [2 Apr.19,'88] the latter with four years' experience and 50 cases, still advocate it strongly; but no one of any generally recognized position in genito-urinary matters in any country, as far as I know, has anything to say in its favor.

Ed. von Wahl [21 Nov.25,'89] reports successful excision of traumatic, deep, urethral stricture, with catgut suture of the urethral ends.

INTERNAL URETHROTOMY.

Bell [1 Mar.8] records a death by pernicious urethral fever after internal urethrotomy, performed for retention. This matter is always coming up. Conservative surgeons prefer, in such cases, to perform the open perineal operation, or to do preliminary aspiration; but the internal urethrotomists persist, and find justification in print. Thus, E. R. Palmer, of Louisville, [245 July] makes a very strong presentation in favor of this very act,—internal urethrotomy for close bulbo-membranous strictures,—giving 22 successive successful cases. He uses boric acid internally, fills the bladder with a hot 1 in 2000 bichloride solution immediately after operating, which the patient voids voluntarily immediately upon the withdrawal of the catheter. A catheter is sometimes tied in and the bladder washed.

URETHRAL FEVER.

Da Costa, of Philadelphia, [82 May 10] believes in a neurotic form of this affection. Zuelzer [276 Nov.20,'89] has demonstrated the existence of reflexes upon rabbits by irritating the prostatic urethra, especially the region of the veru montanum, apparently without urinary contact and without chill.

URINARY INFILTRATION.

E. Fuller, of New York, [245 Apr.] publishes an excellent study of a case of deep, extra-peritoneal extravasation of urine into the

thigh, showing that the urine escaped outside the capsule of the prostate, in the meshes of the fascia propria, between the peritoneum and deep pelvic fascia and outside the sheath of the iliac vessels deep into the thigh, under Poupart's ligament. He cites some analogous published cases.

DISEASES OF THE PROSTATE.

Enlarged Prostate.—Joseph Griffiths[277 Jan.] has presented an admirable study of prostatic hypertrophy, with plates showing microscopic structure. Reginald Harrison, of London,[22 Jan. 4, 25] furnishes some excellent lectures on practical points of management in prostatic obstruction. Berkeley Hill[645 Jan. 16] has some instructive lectures on catarrh of the prostatic and mem-

FIG. 1.—PROSTATE FULLY EXPOSED. (*Wiener klin. Wochensch.*)

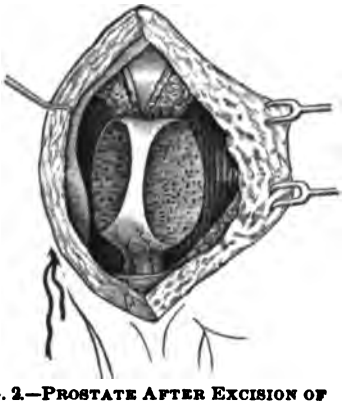
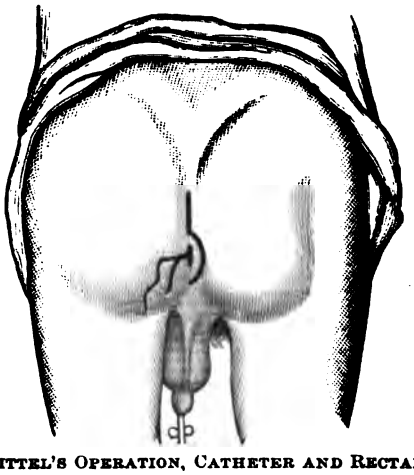


FIG. 2.—PROSTATE AFTER EXCISION OF LATERAL LOBES. (*Wiener klin. Wochensch.*)

branous urethra. The journals contain more than the usual number of prostatectomy and prostatotomy reports, not recorded here because containing no novelty. Dittel, however, has a new proposition,[8 May 1, 5] a method of lateral or bilateral prostatectomy in cases of general hypertrophy. He first convinced himself, by experiments upon the bladder after death, that not alone is median hypertrophy responsible for urinary retention in the aged, but also that extensive hypertrophy of one—and, by so much the more, of both lobes—might be the exclusive cause; and he also demonstrated, by experiment after death, that in the latter instance peripheral excision of both lobes allowed water within the bladder to flow out. Therefore he devised the following

operation: 1. Tie in a catheter so that the urethra may be easily appreciated and shielded from injury by the knife. 2. Stuff the rectum with gauze, that it may also be more easily shunned. 3. From the tip of the coccyx, the patient lying on his belly with his legs hanging down (see figures), make an incision to about the middle of the sphincter ani, and thence around the arms nearly to to the raphe. 4. Dissect away the rectum and expose the prostate. 5. Arrest hæmorrhage and render the wound aseptic. 6. Cut away as much as possible (fig. 2) of each lateral enlarged lobe, leaving only a small amount of substance to protect the prostate. 7. Arrest hæmorrhage, pack lightly, and drain.



LINE OF INCISION IN DITTEL'S OPERATION, CATHETER AND RECTAL TAMPON IN PLACE. (*Deutsche Med. Wochenschrift.*)

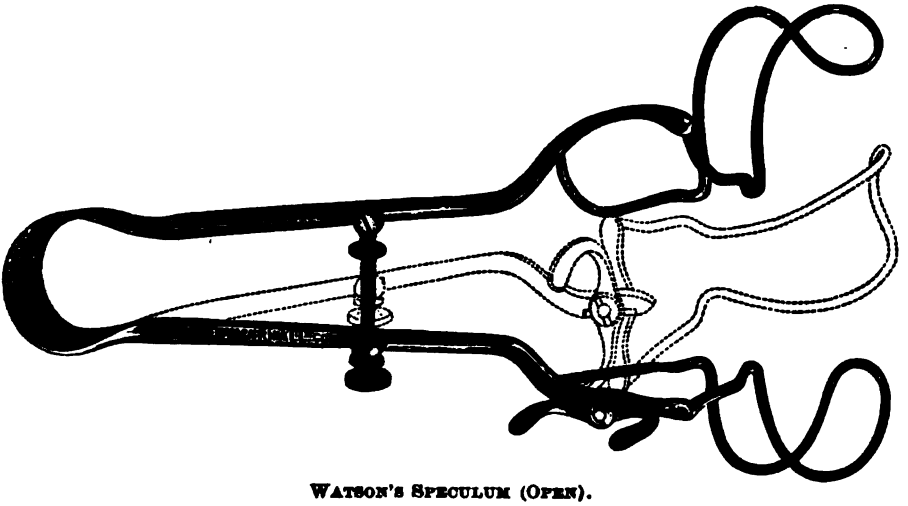
The end of the sacrum may be taken off in extensive operations. This incision Dittel thinks an appropriate one for the removal of tubercular seminal vesicles. If the middle lobe is also large it may be removed later by the supra-pubic method. This operation has not yet been tried on the living subject.

Prostatectomy.—Belfield [5 Nov.] considers this question at length by the perineal and the supra-pubic methods, rather advocating the perineal for feeble patients, on the ground that its mortality is less than the other as 9 to 16. He has a summary, in tabular form, of 98 cases.

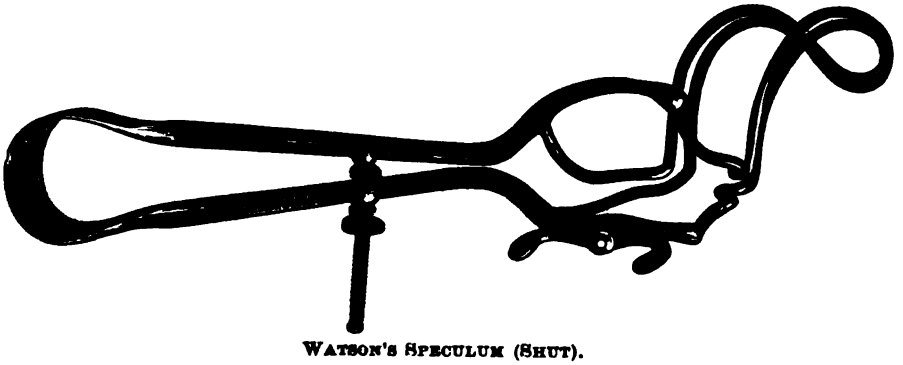
DISEASES OF THE BLADDER.

Instruments.—F. S. Watson, of Boston, [6 Oct. 18] has devised a speculum for use in cases of supra-pubic section. The figures represent

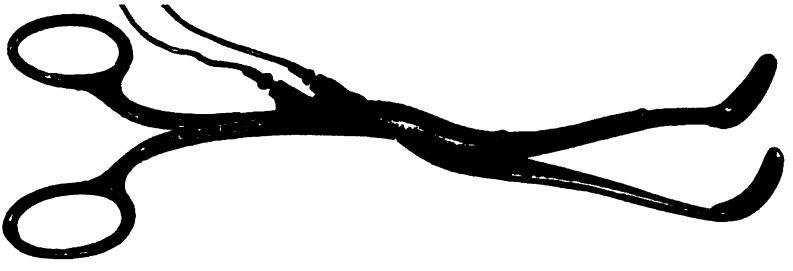
the instrument open and shut. He also proposes a scissors-cautery,



WATSON'S SPECULUM (OPEN).
(*Lancet.*)



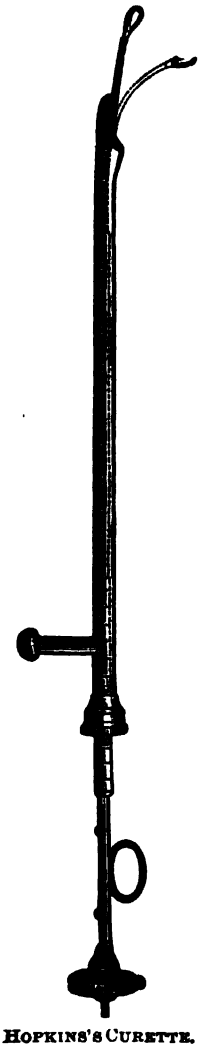
WATSON'S SPECULUM (SHUT).
(*Lancet.*)



WATSON'S SCISSORS-CAUTERY.
(*Lancet.*)

the action of which is obvious and the apparent advantage equally clear.

G. G. Hopkins[157 Jan.] has described an instrument for the purpose of curetting the male bladder through the natural channels. He states that in this manner he curetted away a lot of papillomatous matter, to the great relief of his patient.



HOPKINS'S CURETTE. (*Brooklyn Medical Journal.*)

Goldschmidt, of Berlin,[84 Jan.11] reports 300 cystoscopic examinations in two and a half years. He considers the instrument as useful, and less dangerous than *sectio alta.* Nitze has added an irrigating-tube to his instrument,[84 Mar.16] single or double, for washing out the bladder of foul or bloody contents while the tube is in place. Helferich[84 Jan.,'90] and Wallace, of Edinburgh,[36 Feb.] join in lauding the cystoscope and cite cases.

Rupture.—Knight, of Auckland,[557 Apr.] reports a case of intra-peritoneal rupture treated successfully by suture.

H. Schramm[84 Aug.16] records a successful case of laparotomy and vesical suture for intra-peritoneal rupture, the operation being undertaken fifty hours after the accident,—being the longest time noted in a successful case, excepting the case reported by Knight, from Auckland, New Zealand, with a fifty-four hours' interval.

Pneumaturia.—F. Muller[4 No.41,'90] records a case of this rare affection, in which the cause was the one now known to be the most usual one in this affection,—fermentation of saccharine urine within the bladder.

Stone.—Sir Henry Thompson[6 Mar.15] communicated to the Royal Medical and Chirurgical Society the results of his 964 cases of operation for calculus by all methods, the most important conclusion being that the new crushing method—litholapaxy—had reduced his mortality in crushing nearly one-half. His experience embraces 325 cases of litholapaxy, 475 by the old operation. Dittel publishes his statistics also,[84 Jan.30;Mar.6,13,20] those of his sixth hundred cases of stone, tabulated as follows:—

	Deaths.	Percentage.
70 litholapaxies,	4	about 5
8 median operations,	1	" 12½
22 supra-pubic operations,	5	" 22

E. Solly [418 Vol. 28] presents in tabular form a complete list of all the cases of urinary calculus treated in his hospital service for twenty years, ending in 1888:—

6 renal,	2 deaths.
52 lateral, up to 16 years,	4 "
31 " older than 16 years,	9 "
13 supra-pubic operations,	2 "
33 lithotrity,	4 "
Of these, 27 litholapaxies,	1 death.

Adherent Stone.—A. Martinez Vargas [51 Apr. 8] reports an adherent vesical calculus successfully removed, and considers the question of adhesion at length, citing 23 published cases.

Litholapaxy.—E. Wickham [17 May 24] produces a new washing-bottle, much like Thompson's, but with still more valvular machinery. George Chismore, of San Francisco, [245 Aug.] gives his experience with his first 50 cases of litholapaxy, all since 1886, and with results never excelled, namely, a clean record without a death.

In Children.—J. William White, of Philadelphia, [9 May 17] reports a case, and Lewis W. Marshall, of Nottingham, [6 Dec. 14, '89] 8 cases in young children, average age 5½ years; but the most interesting report is that of Surgeon-Major D. F. Keegan, of India, [6 Oct. 4] who tabulates the 125 cases of litholapaxy performed by himself upon male children between December, 1881, and April, 1890, each in a single sitting, at ages ranging from 1¾ to 14 years, upon stones ranging from 606 to 2 grains (39.27 to 0.13 gramme). There were 4 deaths, all from extensive pre-existing kidney disease.

Supra-pubic Lithotomy.—Lange, Willy Meyer, and L. A. Stimson report successful cases [1 May 17]; J. W. White, a fatal case [2 July 8]; Kehr, of Halberstadt, a successful case, with suture of the bladder and primary union [4 Mar. 5]; Craven, 2 successful cases [6 Apr. 19]; Whipple, of Plymouth, 1 success [6 June 28]; A. R. Anderson, Nottingham, 1 success [6 Apr. 26]; Lachlan McFarlane, 1 success [39 June 2]; Wyeth, 1 success [101 Feb.]; Austin Meldon, 1 fatal case [2 Feb. 15]; J. Barter, a stone ℥xix ʒv (610.44 grammes), removed by high operation after failure by the perineum—fatal result [6 May 8]; Lavista, Mexico, a success [74 Mar.]; J. Geiger, a success [568 Jan.]; J. E. Trevor, 2 successes [557 Apr.]; W. S. Elkin, 1 success [117 July]; G. Buckston

Browne, of London, 2 successes $_{\text{Mar.15}}^{2}$; Kehr, 1 success $_{\text{Mar.3}}^{4}$; and Naismith, 1 success $_{\text{Feb.}}^{36}$; all going to show the widespread and increasing popularity of the method. O'Hara, of Melbourne, 20 successes ^{1000}; J. S. McArdle, a success for encysted stone $_{\text{Mar.}}^{16}$; Henry O'Neill, 1 success $_{\text{May 24}}^{2}$; Beck, 1 success $_{\text{May 24}}^{150}$; A. D'Hollander, 1 success. $_{\text{Dec.28,'99}}^{52}$ J. William White $^{275}_{\text{Oct.}}$ removed a stone of 9½ ounces (295.45 grammes) successfully by the supra-pubic method; and J. Henry C. Simes, $_{\text{Aug.}}^{96}$ an 8-ounce (248.8 grammes) stone by the same method, with fatal result. Rydygier $_{\text{Aug.16}}^{84}$ records a successful case of intra-peritoneal cystotomy for stone, and applauds the method. On the fifth day the catheter was removed, and on the twelfth the patient was well.

Supra-pubic Cystotomy.—Hunter McGuire $_{\text{May 17}}^{9}$ reports 26 cases, with 1 death; Bassini, $_{\text{May 29}}^{8}$ 21 cases, 1 death; Eigenbrodt, $_{\text{B.30,N.12}}^{301}$ 38 cases of Trendelenburg, 7 deaths; Vander Veer, $_{\text{July}}^{216}$ 7 cases, 1 death; Rose, $_{\text{Jan.8}}^{22}$ 1 success at King's College Hospital; G. Buckston Browne, $_{\text{Mar.15}}^{2}$ 13 cases, 4 deaths. A. W. Mayo Robson $_{\text{Oct.11}}^{2}$ records a series of 18 supra-pubic cases, all successful. In 10 the bladder was sutured with chromicized gut, and in only 1 did the suture give way.

Rupture of Rectum by Petersen's bag distended with only 8 ounces (248.8 grammes) of water is recorded by G. R. Fowler, of Brooklyn. $_{\text{Aug.}}^{96}$ The result was fatal.

Tumors of the Bladder.—Sir H. Thompson $_{\text{Aug.9}}^{2}$ gives his experience with 41 cases; 26 recovered, 15 died at periods varying between three days and four months; 2 cancer, 2 papilloma, 11 myomata. Thompson strongly advises against any attempt to remove the growth where, after the knife has opened the way, the finger and the eye can make a diagnosis of carcinoma, epithelioma, or sarcoma; believing that attempts at removal aggravate the patient's sufferings and, perhaps, hasten his end.

An admirable paper appears from the pen of Higgnet $_{\text{Jan.25}}^{52}$ upon papilloma, with a case of successful supra-pubic removal. Another good paper by Bazy, $_{\text{Jan.25}}^{81}$ and an excellent study of villous tumors, with plates, by Charles N. Dixon Jones, of Brooklyn. $_{\text{Mar.8}}^{9}$ On the same subject is an article by Enrique Portuondo, of Havana. $_{\text{Nov.}}^{459}$

Antal $_{\text{Nov.}}^{96}$ records three papillomata, removed from the bladder *per vias naturales*, after location with the cystoscope. Two tumors were from the same patient, a woman.

Inguinal Cystocele.—Hedrich, Boeckel's assistant in Strasburg, [168] Jan., Feb., Apr. publishes a number of operations, including personal experience, for hernia, in which the bladder was encountered as part of the strangulated mass, tabulating all cases. The first operation was by Roux, in 1853, the last by Boeckel, in 1889,—10 in all. The bladder was opened in 7 of the cases. Six of those operated on recovered, in 5 of which the bladder was opened.

Guelliot, on the same subject, tabulates 13 cases, the first by Plater before 1680, the last by himself in 1889,—4 deaths, 2 uncertain. He advocates excision and suture, with frequent catheterization.

Absorption of a Piece of Celluloid Catheter within the Bladder.—Salzmann [96] Apr. narrates that a piece of celluloid catheter was broken off within, and not extracted from a man's bladder. The patient died two years later, and on making a post-mortem examination nothing was found in the bladder,—one small argument, at least, in favor of this form of catheter.

DISEASES OF THE URETER.

Stone.—Rufus B. Hall [59] Oct. 19 reports an obscure case, giving symptoms of impacted ureteral stone, complicated with acute hydronephrosis. The stone was first located by laparotomy. Then the kidney-cyst was opened through a lumbar incision, and by combined manipulation the stone was removed without making any communication between the peritoneum and the pelvis of the kidney. Hall claims this as the first reported case of removal of stone from the ureter by the combined method, but cites the cases of removal of ureteral stone by other methods, of which he has found four recorded: Cullingworth, [1001] v. 28, p. 275 fatal; Terrey, [5] v. 27, p. 507 success; Berg, [317] Jan. 29 success; and A. T. Cabot, [99] Sept. 14 success. This last case is the only other one I find for the year 1890. The incision was lumbar-vertical.

DISEASES OF THE KIDNEY.

Operations in steadily increasing numbers, on all hands and from every place, appear in the journals of 1890, some of which are notable. Terrillon [3] June 11 reports an epitheliomatous kidney removed from a woman of 45, with perfect maintenance of the cure for two years—the date of report. Knowsley Thornton [22] Nov. 27, Dec. 11, '89 makes the surgery of the kidney the subject of his very interest-

ing Harveian lectures. The number of cases operated on for pyonephrosis and for stone is very great. Le Dentu[5 Mar.] reports his second attempt to attain primary union by suturing the kidney-substance after extracting stone when there was no suppurative pyelitis. The first case failed; the second succeeded. Seven catgut sutures were applied.

Tuffier[3 Jan. 15] proposes to cure renal fistula left by old operation by excision of the fistulous tract and suture. He reports a success and advises the expedient when the ureter is patulous and the kidney and its pelvis reasonably healthy.

Nephrorrhaphy.—W. W. Keen, of Philadelphia,[96 Aug.] gives 4 successful cases of his own, in which he sutured the kidney-substance and attached it to the split deep aponeurosis with six boiled-silk sutures. His collated table contains 134 cases, of which 4 died ($2\frac{98}{100}$ per cent.). Of the 121 detailed thoroughly, 63 were permanently cured, 21 improved, 19 failed,—surely a very good showing for an operation about the advisability of which there has been so much contention. McCosh, of New York,[1 Mar. 15] goes over about the same ground, giving his own 4 successful cases and a table of 117 all told.

Nephrectomy.—A successful case for adenoma of the kidney is reported by E. L. Keyes, of New York,[5 Dec.] notable only for the fact that two good pathologists pronounced the specimen cancer (see colored plate for its gross appearance), causing a bad prognosis as to ultimate recovery to be given. But when the patient became and persisted in remaining well, Keyes had another examination made of the specimen by Biggs, who pronounced it adenoma and gave an excellent essay on that disease. May not this case explain some reported cases of recovery after operation on cancerous kidney?

Nephrolithotomy.—Six successful cases of this operation in which the stone was sought, the kidney opened, and in 5 of which stone was found, are reported by E. L. Keyes, of New York.[1002 Feb.] In 1 the stone was notable for its size ($1\frac{1}{2}$ ounces—46.6 grammes) and its fantastic character. (See cut.) It was removed in pieces and the patient is now well at his duties, passing clear urine, but with still a small fistula in his side.

Paranephric Cysts.—Robert Abbe[1 Aug. 9] gives 2 successful cases of this uncommon affection, treated, 1 by anterior explorations

Adenoma of the Kidney (Keyes).
American Journal of the Medical Sciences.

Beck & Mc Letrick, Lith. Phila.

and then coincident lumbar drainage, the other by laparotomy and anterior drainage.

Partial Extirpation.—Kümmel, of Hamburg, [336 May 3] refers to Tuffier's Parisian demonstration of successful partial extirpation of the kidney in animals. Tuffier observed that for each kilogramme of animal 1½ grammes (23 grains) of secreting substance of kidney was necessary. On this basis the ordinary man needs from 80 to 100 grammes (2½ to 3¼ ounces), one-third to one-fourth of what he actually possesses. Kümmel cites as the first case of

STONE REPRODUCED FROM THE FRAGMENTS.
(*Trans. Med. Soc. State of New York.*)

partial excision one reported by Herczel from Czerny's clinique in Heidelberg. Cure followed. Kümmel then gives 2 cases of his own. A 41-year-old woman; abscess in wall of kidney excised and partly brought together with sutures, one-third of the organ removed, and wound packed with iodoform gauze. On third day the patient left her bed and recovered, no drop of urine ever passing by the wound. The second case was a 58-year-old man. The upper part of the kidney was excised and cure obtained, no urine passing by the wound.

Nephrotomy.—L. McL. Tiffany, of Baltimore, [5 Jan.] reports a

case of simultaneous nephrotomy for abscess of the kidney and perineal lithotomy for phosphatic stone. The patient did well, and the doctor thinks well of the double simultaneous operation.

Pyelitis.—Harrison, of Liverpool, $^{6}_{\text{Dec.7,'89}}$ brings forward a plea already advanced by Guyon, that in some conditions of pyelitis of the simple suppurative variety—notably when the cause of the pyelitis is obstructive below, as in the case of stricture—much permanent improvement to the pyelitis is brought about by perineal bladder-drainage.

Operative Statistics.—E. Herczel $^{113}_{\text{Oct.20}}$ publishes Czerny's operative statistics at the University Clinique in Heidelberg, covering twelve years. There were 33 nephrectomies, with 17 deaths—50 per cent. These he divides into classes.

	Recoveries.	Deaths.
5 nephrectomies for pyelonephrosis,	2	3
4 " " hydronephrosis,	1	3
1 uretero-vaginal fistula,	1	0
12 malignant growths,	3	9
11 suppurating kidney,	9	2
33	16	17

He prefers the lumbar operation with oblique incision, and puts on one silk and one elastic ligature, fearing the evil effects of possible purulent infection through a perforated vein, if the pedicle be transfixed. There were 7 nephrotomies, 3 being simple cases, of which 1 recovered, 2 died; 4 were subsequently nephrectomized. He does not seem to like this last operation, and thinks that often in these suppurating cases both kidneys are so far involved that what secreting portion is left is incapable of taking on compensatory hypertrophy when one kidney is removed. There were 3 nephrolithotomies, all fatal, as both kidneys were diseased. Of 4 pyelonephrotomies, in two stone was found, both of which recovered. In the other two no stone was found, and both patients were subsequently nephrectomized, as the fistula would not heal.

One case of partial nephrectomy is given at length. An angiosarcoma, due to injury, was removed with a portion of the kidney extending into the cavity of the pelvis, and the kidney was sutured. Recovery followed. Julius Schmidt, of Cologne, has already published a cure, at the hands of Bardenheuer (ANNUAL for 1890, vol. iii, E–33), of a case in which, however, the pelvis was not opened.

SYPHILIS.

By J. WILLIAM WHITE, M.D.,
ASSISTED BY
EDWARD MARTIN, M.D.,
PHILADELPHIA.

PROPHYLAXIS OF SYPHILIS.

Commenge,[245] in a memoir submitted to the Paris Academy of Medicine concerning prostitution and the prophylaxis of syphilis, finds that, among 16,747 women recognized as diseased, 2003 were licensed by card, 2779 were living in licensed houses of prostitution, 3282 were women irregularly under control, and 8683 practised clandestine prostitution.

This report would strongly indicate the necessity for a rigorous enactment of laws devised for the purpose of preventing the spread of venereal disease. The suppression of the Contagious Diseases Act in England,[22] has been followed by an increase of syphilis among the soldiers. In fourteen stations the percentage rose from 27 under the act to 50 after the act had been abolished. In Hong Kong a memorial has been submitted by the medical practitioners of that colony to the colonial secretary in which the authorities are urged to again enforce the Contagious Diseases Act for the benefit of the community in general. The increase in venereal affections in both civil and military populations has been enormous, and is directly traceable to the removal of the check upon the dissemination of the disease.

This has been the case wherever Contagious Diseases Acts have been enforced. The medical evidence in their favor is simply overwhelming. The most violent opposition comes from those who oppose them on what they believe to be moral grounds. The testimony in their favor, however, has for many years been more than sufficient to show that, as regards all true morality, the acts exert a distinctly favorable influence.

THE NATURE OF SYPHILIS.

Lydston [19 Apr. 19] considers that syphilitic lesions are dependent upon trophoneuroses. Syphilitic fever is due to the action of the poison on the sympathetic ganglia. The papillary layer of the skin is especially affected in the secondaries on account of the narrowness of its capillary vessels and their close connection with the lymphatics. The cervical ganglia, particularly the one supplying the sympathetic branches of the fifth nerve, seem to be especially subject to the attacks of the poison. The susceptibility of the iris is attributed to its abundant sympathetic supply. Mercury and iodide of potassium do not act as direct antidotes, but produce fatty degeneration and elimination of syphilitic products.

This view as to the action of mercury is one which was long since advanced in explanation of its effects upon syphilitic products, but to-day the evidence seems rather in favor of a true antidotal action, bringing its antisyphilitic properties into line with the well-known antibacteric properties of most of the mercurial salts.

In considering the trophoneurotic character of late syphilitic lesions, the author holds that the nervous system may be acted upon by the direct effect of syphilitic deposits upon the nerve cells or fibres or the membranes of the brain and spinal cord, by changes in the membranous envelope of the spinal cord, by deposits in and about the blood-vessels which produce circulatory disturbances, by proliferation and condensation of connective tissue which remains after the syphilitic material *per se* has been removed.

A very important paper by Finger, [45 a.m., p.m.] on "Syphilis as an Infectious Disease," considers the subject from a bacteriological stand-point. He admits that, as we have not yet obtained and inoculated into animals cultures of the specific bacillus of syphilis, we are still on the broad path of hypothesis as to its bacteriology, but he believes it to be a good time to discuss some important questions which he thinks have been somewhat lost sight of. He ascribes the general symptoms in the primary stage of syphilis—the languor, fever, malaise, pain, etc.—to intoxication by the ptomaines produced by the virus, as he believes these symptoms to be too ephemeral and changing to be ascribed to localizations of the virus.

In the secondary stage the various eruptions on the skin and mucous membranes are caused by local deposits of the virus. Their virulence proves this; but a great many of the so-called secondary symptoms are of intoxicative character, being due to tissue products passing into circulation, and causing a general, often severe, nutritive derangement. After the second stage comes a long stage of latency,—for many, a period of cure; for others, only an interval between the second and third stages. That the virus still exists in the body is shown by recent cases of Landouzy $\frac{3}{\text{Sept. 18, '89}}$ and Hardy, described before the International Congress of Dermatology and Syphilography, 1889; also by its hereditary transmission. The general health is not perfect. The immunity against fresh infection is the chief characteristic of the above latent period. We do not know how long it lasts, but its duration is certainly limited, in some cases at least, as the undoubted cases of re-infection show. The immunity, as mentioned, began even in the primary period. It is an immunity only against fresh virus. The first virus that caused the infection may still cause relapses.

The immunity in the primary stage is due to tissue products of the virus in the circulation, the infected foci being still strictly localized. In support of this, there is the undeniable fact that, under certain conditions, persons may acquire immunity against syphilis without passing through its stages. Hereditary syphilis teaches us this. The specific products of syphilis have been taken into account in explaining the two following kinds of immunity from syphilis: 1. Colles's immunity. 2. Profeta's immunity. By Colles's immunity is meant that which is shown by those healthy mothers who, owing to latent syphilis in the father, have borne syphilitic children, but have themselves escaped infection. This immunity has been proved in thousands of cases, and there is no longer any doubt that it may exist. Caspary and Neumann, even, inoculated without result, as Finger himself has done three times. The immunity in such cases is due to the tissue products of the syphilitic virus which have passed from the fœtus, by diffusion, into the maternal circulation, causing immunity from syphilis without the symptoms of syphilis. It is true, exceptions are published, but they are few. Profeta's immunity ("la loi de Profeta," Fournier) is the immunity of the children of syphilitic parents, either or both being syphilitic. The children in many such cases are born healthy,

and remain healthy; but some of them are proof against the contagion of syphilis, just as if they had had the disease.

This immunity is also due to tissue products of the virus passing into the fœtal blood, the virus itself not passing.

In fact, all immunity from syphilis (and the same holds with all other infectious diseases) is due to the "tissue products" of its organized virus passing into the circulation; for (1) this immunity occurs even in the primary period; (2) it outlasts the period of activity, and even of the presence of the virus in the body; (3) it can be transferred independently of the virus itself. How this immunity is to be explained essentially is, however, still an open question. Metschnikoff's theories of exhaustion and of retention do not suffice. The chemical-contact theory of Liebig seems most plausible. Tertiary symptoms are not due to the syphilitic virus *per se*, but to its tissue products; and this explains how it is that syphilis inherited from the mother is so much more severe than when inherited from the father. A moderate amount of tissue products of the virus (or only slight virulence, or greater resistance of the body) causes simple immunity; an increased amount of morbid products of the virus or greater virulence causes tertiary syphilis.

It has frequently been asserted that there is no relation between the various stages of syphilis, as there is none between the character of the syphilis of the person who supplies the poison and that of the one who receives the infection. Certain cases, however, will be grave or "malignant" from the earliest period, and the dosage of virus or a feeble power of resistance in normal cells may well be factors in determining this gravity.

THE CHANCRE.

Du Castel $\frac{866}{v.1,p.51}$ states that he has only twice seen the commencement of a chancre. In one case it appeared as a small, red spot, which after several hours turned into a papule; this was excised. Several weeks later the characteristic rash appeared.

In another case, ten hours after the chancre was first noticed, it appeared as a papule, which was slightly depressed in the middle. Sometimes a vesicle appears first. Du Castel believes that the incubation period of the chancre is from twenty-five to thirty days and may be three months. The majority of chancres on mucous surfaces leave no permanent cicatrices; on the skin, how-

ever, there generally remains for several years a smooth, shining surface, surrounded by a zone of pigmentation, which is readily recognizable. Ulcerative chancres leave indelible scars.

Monin[245 June] believes that the chancre leaves an indelible trace or cicatrix which may be found in nearly one-half of all syphilitics. This cicatrix, which varies in appearance in accordance with its seat, is almost pathognomonic when it is upon the sheath of the penis. In cases of unrecognized syphilis with doubtful manifestations this trace of the primary lesion is of the greatest value for the purposes of diagnosis and prognosis.

Nivet[824 Feb.] reports a case in which the period of primary incubation lasted forty-six days, the period of secondary incubation eighty-five days.

Puech[824 July] reports 2 cases of chancre in which the period of primary incubation was unusually long. In the first case the period was eighty-one days; in the second case, ninety-seven days. Guérin, Martin, Mauriac, Fournier, and Lefort have all observed cases in which the time elapsing between infection and the appearance of the primary sore was extraordinarily long, ranging between sixty and ninety days. In a number of instances the delay in the development of the chancre seemed to be dependent upon an intercurrent acute febrile disorder, such as pneumonia or small-pox.

Morel Lavallée[24 June 14, '90] cites a case presenting a single, rounded, superficial erosion, without the slightest trace of induration, and with no consecutive lymphatic enlargement. This lesion healed in fifteen days. Three or four days later induration was distinctly perceptible. At the regular time secondary eruption developed.

Ernest Lane[2 Apr. 26] has endeavored to define the exact locality in the urethra where the syphilitic chancre might be met with, to draw attention to certain peculiarities in the progress of such sores, and to note the points by which they might be distinguished from affections resembling them. In 373 cases where the position of the lesion had been accurately determined, he had met with eight sores confined to the urethra and ten involving the meatus and the commencement of the urethral channel. All the sores situated behind the meatus were in the fossa navicularis, and it was contended that sores were never met with beyond the anterior part of the urethra.

Carter[6 Nov. 23, '90] reports an intra-urethral chancre which occupied

the fossa navicularis and caused retention of urine. A similar case is reported by Phelps.[426 June] Each of them yielded to specific treatment.

It is rare that chancres of the urethra produce enough swelling of the canal to cause retention, probably because they are usually situated very close to the meatus, and, if the specific induration is great, tend to cause eversion of the lips rather than to closely approximate the urethral walls. In both of these cases the sore was situated ½ to 1 inch back. Mauriac states that he has never seen a chancre more deeply seated than the fossa navicularis, but Du Castel[17 Sept.4] says that he has recently, for the first time, seen one at least ⅛ inch deeper.

I have never seen chancres at this depth, though there can be no *à priori* reason why they might not occur there. The mechanical obstacles to primary inoculation at such a distance from the meatus are so apparent that the infrequency of deep urethral chancre is easily understood.

Extra-Genital Chancre.—The literature of extra-genital chancre has been peculiarly rich during the last year. The larger proportion of cases contributed are of Russian origin. Contagion through the mouth seemed to be most frequently observed. The lips exhibited the majority of lesions; after these the tonsils and pharynx were involved. In women chancres of the breast were very frequent. In the great majority of reported cases the disease was contracted in other than venereal ways; women are much more frequently liable to this form of the disease than men. Among other statistics upon this subject are to be mentioned those of Veslin,[287 Apr.] Doyon,[287 May] Pavloff,[90 Oct.] Taylor,[245 June] Broich[45 H.4,5] and Poray-Koschitz.[45 H.6] Many others have reported each a few cases.

Von Broich[45 H.4,5] gives an elaborate, although incomplete, bibliography of the literature of the subject for the years 1888 and 1889.

Neumann[22 Feb.15] has reported 84 authentic cases of extra-genital syphilis, 46 of which were on the lips. They are of special interest, as in the whole group of cases the disease was acquired through no fault or misconduct of the patients, but entirely through accident.

A paper by Bulkley[9 Apr.26] supplies interesting information as to the dangers from syphilis in the practice of dentistry, and reports a new case.

Goodell[23 Mar.] gives a number of cases, which came under his per-

sonal notice, of the infection of gynæcologists and obstetricians from their patients.

Taylor, [245 June] in his interesting paper upon unusual methods of infection by syphilis, mentions 2 cases which were probably infected from a cadaver. A patient died of malignant syphilis; eight hours later the physician made an autopsy, wounding his finger while at this work. Within three weeks a chancre developed, followed by secondaries. The second case occurred in the person of a physician who made an autopsy upon a syphilitic patient nine hours after death. A chancre developed, followed by secondaries.

Veslin and Feulard [287 Apr.] report 64 extra-genital chancres. Twenty-nine of these were about the lips, 7 about the breast, 5 about the anus, 5 on the tongue, and 5 on the tonsil.

Tarnovsky [25 July] observed several cases of chancre of the scalp, caused by the use of copper combs borrowed from syphilitics.

Lloyd [6 July 19] reported a chancre at the left angle of the mouth, probably communicated by kissing. Another case of labial chancre was attributed to smoking a borrowed pipe.

Brousse [17 Sept. 20] observed a case in which there were seven chancres of the face, varying in diameter from $\frac{1}{10}$ inch to 1 inch. One was placed upon the free border of the upper lip, the others were located about the chin. These sores presented the typical aspects of hard chancres, and were followed by the characteristic of secondary eruption. The infection was probably produced by the use of a razor.

Du Castel [824 May] states there are certain atypical chancres characterized by multiplicity, by successive development, by intense pain, by small size, by their tendency to form deep ulcers, by the marked swelling, by the slight induration, and by the trifling lymphatic involvement.

Gemi [3 July 16] observed a patient suffering from a slight erosion of the lower lip. There was no induration, no glandular enlargement, and no pain. This lesion was diagnosed as herpes, and was healed over in a few days. Twenty days later there was glandular involvement. The seat of the original lesion was marked only by a faint pigmentation; there was not the slightest trace of induration. The enlarged glands were supposed to be strumous, but the development of secondaries some weeks later proved absolutely that the pseudo-herpetic erosion was in reality a primary sore.

Ohman-Dumesnil[786 June] exhibited a patient suffering from a chancre without induration. After cicatrization, however, induration was noticeable, although there was no return of the ulceration. Neither induration nor enlargement of the lymphatic glands was manifested. A secondary eruption appeared at the regular time, but without apparent involvement of any of the lymphatics.

Though absence of induration is occasionally observed in the female, it is exceedingly rare in the male, whilst escape of the lymphatics is still more uncommon.

Fournier states that ecthyma about the buttocks of infants sometimes assumes an aspect exceedingly like a chancre.

Mauriac[3 Aug. 18] calls attention to the fact that the chancre is not always solitary. He states that he has seen the lesions disseminated on the same person. Thus, in one instance he found a chancre of the chin, one of the lip, and seven or eight of the genitalia. These he believes do not develop simultaneously, but develop successively within ten to fifteen days at the most.

Morel Lavallée[24 June 15] has also observed atypical chancres developing and passing through their various stages, even to perfect cicatrization, without the slightest induration and without any concurrent adenopathy. Induration sometimes followed without recurrent ulceration. These local sores are succeeded by the ordinary secondary syphilides, but without any glandular enlargement in any portion of the body.

Hutchinson[806] reports a case of midwifery syphilis in which the primary lesion was placed upon one of the fingers. This sore never showed anything definite or materially suspicious. The glands in the armpit swelled for a time and assumed the characteristic features of chancroidal bubo, though suppuration did not take place. These local symptoms were followed by manifestations of constitutional syphilis.

Re-infection.—A case of re-infection with syphilis is reported[511 Nov.] in the person of a woman aged 46 who contracted a chancre from her husband, which was followed by the characteristic secondary manifestations. This patient had previously contracted syphilis when she was a child, and had exhibited well-marked secondary and tertiary manifestations of the disease.

Preiss[697 Aug.] states that he has seen several cases of syphilitic re-infection; the second attack occurred in one patient fifty-eight months

after the first infection. In the rest it occurred at periods varying from two to twelve years.

Mauriac communicates an authentic case of re-infection four years and nine months after the primary sore.

Taylor, Jakowlew, Nubarsky, Pospilow, Sagre, Razumoff, and others communicate the histories of similar cases.

SECONDARY SYPHILIS.

Chantemesse and Vidal observed 2 cases of pleurisy in the early secondary stage of syphilis. They note that synovitis is not rare at this time, but state that pleurisy is not generally recognized as a possible manifestation of the disease.

The first case occurred in a woman aged 29 years, who, together with mucous patches, cutaneous syphilides, and articular pains, presented a moderate effusion located at the base of both pleuræ. The second patient was a woman 45 years old, in whom a dry pleurisy of the left base was coincident with a roseolar syphilide. In both patients the pleurisy disappeared at the same time that the syphilides yielded to mercurial treatment.

Dupont has observed several cases of pericarditis occurring in the primary and secondary stages of syphilis, and yielding to mercurial treatment.

The obvious difficulty in obtaining a correct and perfectly trustworthy history in such cases is so great that every such reported instance should be studied with the greatest care.

In the above case the facts as stated seem insufficient to warrant the conclusion. The subject is of the highest practical importance, because, if such cases were frequent, the opinion constantly given to syphilitics in regard to marriage, namely, that after four years from infection and a course of sufficient mercurial treatment, marriage is safe, would require to be seriously modified. I have never seen reason to modify the opinion I expressed in my article on hereditary syphilis in Pepper's System of Medicine, viz.: "Syphilis, after a certain period, not extending much over four years, where the disease is allowed to run its own course, and probably much reduced by treatment, ceases to be a contagious disease; and at about the same time or some time often loses, in the majority of cases, its capability of being transmitted. As there are, probably, exceptions to the rule that this power of transmission disappears

spontaneously within any specified time, it is never safe to trust altogether to the unaided efforts of nature; but a vigorous and sufficient specific treatment must be employed. Given, however, the lapse of a sufficient time,—say from three to four years, as a minimum,—the history of a proper and continuous plan of treatment, and the absence for a year or more of any specific symptoms whatever, and the risks of marriage are so reduced as probably to warrant a careful physician in permitting it."

Sezius, [50 Jan. 24] on investigating the blood of syphilitics, notes that in the beginning of the disease it is normal, but that with the outbreak of general symptoms there is a decided disturbance, which consists in a lowering of the percentage of hæmoglobin and of the number of red blood-corpuscles. When the secondaries are brought under control the blood again becomes normal. Poikilocytosis is also noted, the red corpuscles being oval or deformed. This is not comparable in extent with that observed in pernicious anæmia. The relation of the white to the red corpuscles is not sensibly altered. Szadek, of Kiev, corresponding editor, writes that Sjelmann also finds that in recent cases of syphilis there develops an anæmic condition, which reaches its maximum intensity during the period of eruption. With the disappearance of general syphilitic symptoms, the blood again becomes normal. Mercuric preparations, when administered in ordinary doses, do not take part in the causation of the anæmia.

Martin and Hiller [9 May 17] conclude that both corpuscles and hæmoglobin are reduced in quantity by the development of the secondary syphilides, though this reduction does not always take place. While granting that the tonic doses of mercury may prevent this reduction, they conclude that the effect of this drug upon the blood of syphilitics has not yet been clearly formulated.

TERTIARY SYPHILIS.

Marfan and Toupet [287 Aug., Sept.] publish an interesting contribution to the histology of tertiary lesions. They conclude that there is every reason to believe that syphilis is of microbian origin. The organism, although it has not yet been isolated, undoubtedly exists in the primary and secondary lesions. The clinical evidence would lead us to believe that it had disappeared in the tertiary stage, but because it has disappeared it is not to be supposed that

all trace of its passage has been effaced. During the active stages the whole organism is greatly affected, and a sort of post-syphilitic dyscrasia is the result. This shows itself by the development of arterial sclerosis, sometimes by amyloid changes in the vessels, which alterations are found in conjunction with all the late syphilitic lesions. Iodide of potassium, which is so invaluable in treating syphilis, is also the most useful of all known remedies in chronic "arteriopathies," whatever their origin.

Fournier, [22 Mar. 19] on the basis of 2600 cases, observed during the past twenty-nine years, states that the epoch of the appearance of tertiary syphilis rises rapidly from the first to the third year; at this time the majority of cases are seen. From then to the eleventh year there is a rapid diminution in the number of cases. Tertiary symptoms become more rare with the lapse of time, until after the thirtieth year, when they form the rare exception.

Among Fournier's cases there were 157 in which the generative organs were involved. The disease frequently appeared in the form of ulcerating syphilides, which closely resemble the chancre. In fact they have often been taken for a second attack of chancre, and on the basis of this mistaken diagnosis re-infection of syphilis is believed to have occurred.

Muscular atrophy occurred in 19 cases, and in some instances seemed to be directly due to the syphilis. The nervous system seemed to be especially involved in tertiary lesions, no less than 1085 cases having been observed. These affections are not necessarily specific in nature, though they are certainly specific in origin. The instances of cutaneous tertiary affections numbered 767; those of involvement of the mucous membrane, 612.

At the meeting of the International Congress of Dermatology and Syphilis, 1889, there was a general agreement to the effect that tertiary accidents are more frequently precocious than is generally supposed. It was also stated that tertiary manifestations do not follow secondaries in the great majority of cases, and that such *sequelæ* are less probable when mercury is skillfully employed.

Haslund [41 Oct. 9] states that in over 5000 cases of syphilis, about 10 per cent. were observed who suffered from tertiary manifestations of the disease. The skin was most frequently affected. This is not in accord with Fournier, who states that tertiaries most

frequently involve the nervous system. Haslund, however, takes his figures from hospital practice, while the statistics of Fournier are, in part, from his private case-book. On a careful examination most of these tertiary cases were found to have had either very imperfect specific treatment or none at all. A small number were observed who had undergone a careful systematic specific treatment. As predisposing causes to tertiary development, alcoholism, malaria, congenital syphilis, and infection in the very early or the very late period of life were found to be important factors. Traumatism and irritation are probably the most important factors in the localization of tertiary symptoms. Thus, a preceding gonorrhœal orchitis is frequently followed by gumma of the testicle, and neurotics and epileptics are especially prone to involvement of the nerve-centres. From these figures it would seem that a careful, systematic, and prolonged constitutional treatment affords the best protection against the tertiary manifestations of this disease.

Mauriac states that tertiary syphilis occurs in from 10 to 20 per cent. of all cases, but less often in those not treated.

Vajda agrees with Haslund that the majority of tertiary syphilitics are those who have received no specific treatment, and that these patients exhibit the disease in its most malignant form.

Cochet [24 Feb. 16] reports 2 cases of premature ulcerative syphilides developing upon the genitalia. In the first case, five months and a half after the appearance of the chancre, immediately following an attack of congestion of the lungs, there developed at the site of the local lesion an indurated ulcer closely simulating the original chancre. In the second case this recurrence was noted ten months after the chancre, and appeared after a double pneumonia. The ulcerations in both cases closely simulated the initial lesion, and might readily have given rise to a mistake in regard to the time when the disease was acquired. Szadek, of Kiev, Russia, corresponding editor, says that Kasansky [586 No. 24] details a case interesting from the fact that primary, secondary, and tertiary syphilitic symptoms were present in the same patient at the same time.

Taylor [245 Mar.] reports the history of an exceedingly interesting case of syphilis. The patient suffered from indurated chancre before puberty. Under the usual intermittent treatment his secondaries disappeared in the main, though he did not gain in strength or flesh. In less than two years he was attacked with a grave cere-

bral affection. This was cured by treatment. The man for fourteen years showed no tendency to a relapse of the brain trouble, but he was at intervals attacked by syphilitic infiltrations of the skin, fibrous tissues, connective tissues, and the bones. These were of large extent and of destructive tendency. During this long period of gummatous infiltrations the patient procreated two healthy children and his wife suffered from no miscarriages.

The brain symptoms in this case undoubtedly were due to meningitis. The group of symptoms characterizing subacute syphilitic meningitis is, to an extent, characteristic. There is a history of ill-health and prodromal headache, which may be local or general, continuous, intermittent, or nocturnal; there is anæmia and cachexia. Evidences of mental impairment are shown by rambling conversation, incoherent phrases, want of memory, and torpor of the intellect. Paralyses, local and general, are frequently observed and the special senses are impaired or perverted. When this disease is further advanced the patients take to their beds and are often treated for typhoid fever. The onset of diffuse syphilitic meningitis may be in the early months of syphilis, in the first or second year, or even later. It generally occurs within two years of infection. At later periods the affection is more localized and more unsymmetrical in its development. In these cases mercurials in the form of inunctions should be combined with the iodide, even when the affection occurs as late as the sixth or seventh year.

Ewald[4] considers that the syphilitic nature of tabes is strongly suggested by the frequent occurrence in this disease of obliterating arteritis and phlebitis of the vessels of the cord, and by the presence of gummatous arachnitis and chronic interstitial myelitis. He holds, however, that the pathological changes in the vessels are not necessarily characteristic of syphilis.

Lustgarten[59] records some cases of glandular affections of the late stage of syphilis (gummatous lymphoma). He accompanies it with an interesting review of the history. As to diagnosis, glandular gumma, when a single gland is affected, may be confounded with primary carcinoma or sarcoma (in a restricted sense) of the glands, enchondroma, scrofulosis, actinomycosis. Sarcoma, in general, will be differentiated among other things, by its rapid growth, enchondroma by its very slow development and great firmness;

whereas the great rarity of primary glandular carcinoma, in dubious cases, will lead to the supposition of gumma. In scrofulosis—that is to say, tuberculosis—there is, besides the differences of course, complications, color, etc., the theoretical difference shown by bacteriological examination. I use the term "theoretical" because, in practice, the demonstration of bacilli in glandular pus often does not succeed, and experiments on animals are not always easily carried out; and for the further reason that, unless the latter are made with all the precautions of modern bacteriological technique, they will, more than ever, give rise to misleading diagnosis. On the other hand, actinomycosis will readily be recognized by demonstration of its characteristic micro-organisms.

If many glands are attacked, there come into consideration the primary simple hypertrophies, an affection which is especially described by older French authors as frequently occurring in the army; the scrofulous, that is to say, tuberculous glands; the leukæmic tumors, which, in addition to the examination of the blood, are further characterized by their mode of extension and by their softness; and the malignant lymphomata (pseudo-leukæmia, Hodgkin's disease). Although, in respect to the latter, the gummous lymphomata are characterized in general by a greater inclination to softening and ulceration, and by a more slow and benign course, yet diagnosis may sometimes be difficult.

If the glandular gummata are secondary to, or followed by, other symptoms of syphilis, there will be no difficulties encountered in forming a just estimate of the process.

Lustgarten $\frac{113}{\text{July 18}}$ finds that this syphilitic enlargement involves the subcutaneous lymphatic glands, particularly those of the inguinal region, and the submaxillary and infra- and supra- clavicular groups. The involvement of the cervical, axillary, and cubital glands is less frequently noted, Generally a group of glands or the glands of one or more regions of the body are involved; enlargement of a single gland is rare.

These enlarged glands appear as round or oval, hard or elastic tumors, with uneven surfaces, sometimes softened centres, and occasionally yielding a sense of fluctuation on palpation. Some of these tumors are as large as a cherry; others reach the size of an orange. In general they are about the size of a walnut. The tumors are usually indolent, slightly painful on pressure, and frequently during

the night give the patient stabbing or cutting pain. The pain rarely reaches the intensity of that of malignant tumors.

In the beginning these enlargements are freely movable; later on they become glued together and fixed to their surroundings. They may contract firm adhesions to vessels and glands. The skin over these tumors in the majority of cases is freely movable; it may contract adhesions over those which are most prominent, and may become involved in an ulcerating process, making a characteristic syphilitic ulcer. This ulcer may extend, forming a wide-spread, serpiginous, tertiary syphilide.

Tertiary lymphomata are found concurrent with secondary or tertiary lesions, or they may appear as the only manifestation of the syphilitic disease. These tumors are essentially chronic in their course, and may last as hard swellings for months, or even years, although frequently they soften and break down within a few months. As is the case in all tertiary manifestations, spontaneous cure is exceedingly rare.

The treatment of these enlargements should be pushed energetically. Iodide of potassium should be aided by the use of inunctions of mercury and the internal administration of the latter drug. This course of treatment should be followed by massage and warm baths, and a general hygienic and tonic treatment.

Elsenberg[4, No. 6] reviews the literature of syphilis as predisposing to and complicating tuberculosis. At the present day the question meets with the explanation that in a tuberculous individual, whose whole organism is involved, the powers of resistance in the tissues are lessened, the nutrition suffers, etc. When such an individual becomes, in addition, infected with syphilis, the working of the combined diseases upon the organism has the greater effect. The syphilis then runs a malignant course, calls forth severe symptoms, causes much disturbance of the tissues, and favors the development of the already existing tuberculosis.

Verneuil says the two processes may run their course side by side independently or influence each other so as to produce mixed forms (morbid hybridity), having entirely different course and prognosis, and being differently affected by treatment. If scrofulosis (tuberculosis) influences the appearance of syphilis, the ulcerating products of the later stages are so metamorphosed as to be scarcely recognizable (scrofulo-syphilitic hybridity).

Among the characteristics of these forms belong freedom from pain—especially the lack of increased sensitiveness, which is a usual symptom of the true syphilitic type. For example, there is no photophobia, no supra-orbital neuralgia in inflammation of the cornea, no pain in joint and periosteal affections.

De Amicis[287 June] reports a case interesting because the rapidity and extent of a gummatous swelling suggested the possibility of a sarcoma. Thirty-five years after having contracted syphilis the patient developed, together with other lesions, a swelling of the left side of the chest. In nine months this had attained the dimensions of 9 x 8 inches and projected 4 inches from the surface. Under the influence of the iodide treatment this growth entirely disappeared in a little less than three months.

Esmarch[9 Mar. 15] has advanced the theory that many cases of apparent sarcomata are really gummata, and are curable by antisyphilitic treatment. He believes that by heredity nearly the whole population of Europe has some syphilitic virus in their blood, but so attenuated that it does not cause the typical acute symptoms. In all cases not amenable to operation he advises an attempt at cure by antisyphilitic medication.

Hutchinson[806 July, '89] calls attention to the fact that some of the most unpromising cases of syphilitic disease of the testicle yield to careful constitutional treatment, and narrates two instances where antisyphilitic treatment proved more successful than the surgeon's knife.

Euthyboule[87 June] describes a syphilide of the nose which in its main features closely resembles acne. He believes that this manifestation is favored by alcoholism, and agrees with Horand that imperfect treatment at the beginning of syphilis is also distinctly predisposing. This eruption upon the nose is a manifestation occurring in the late tertiary period of the disease. Surgical treatment is perfectly powerless to cure it. It is symmetrical, involves the middle of the nose, is most commonly found in men, and yields to specific treatment.

Buchler[245 May] observed 2 cases of involvement of the temporo-maxillary articulation in syphilitic disease. The first patient appeared with gumma of the pharynx, which yielded to specific treatment. Some months later a swelling of the temporo-maxillary articulation developed, attended with restricted motion and some pain.

There was evident effusion within the joint and pain was elicited on attempts at motion. Specific treatment produced great amelioration in the symptoms.

The second case occurred coincidently with the usual secondaries. Specific treatment produced a complete cure within two weeks. A case of initial lesion of the vagina is also reported. This was situated in the right lateral wall and exhibited a typical cartilaginous induration. There was well-marked polyganglionic adenitis of the right inguinal region. The glands of the left side were in normal condition.

The author believes that salicylate of mercury, given $\frac{1}{8}$ grain (0.022 gramme) three times a day, causes a rapid involution of the cutaneous manifestations of syphilis, and also favorably affects those of the mucous membranes. It would appear that this salt is very like the protiodide, but possesses the advantage of being better tolerated by the gastro-intestinal tract. On the spleen it seems to exert a very favorable action.

Landouzy[25] reports a case of syphilitic contagion during the tertiary period.

Fournier also reports the case of a young man who had contracted syphilis fourteen years before and who had recovered under treatment. He married and afterward suffered from sclerous glossitis, with erosions on the tongue. Two years later his wife developed a chancre of the lower lip, together with secondary symptoms. At this time no lesions were found in the husband's mouth except a few erosions.

Mauriac[212] states that tertiary syphilis rarely involves the mammæ. It may, however, appear at times, and is then found either in the form of an infiltration or as a gummatous tumor. The infiltration is probably more frequent in men than in women. It is ordinarily observed during the end of the secondary period and is accompanied by slight subjective symptoms. It rapidly disappears under treatment.

Gummata or gummatous ulcers are found much more frequently in men than in women. These lesions begin in the form of a small tumor, deeply placed and sharply circumscribed. The tumor gradually enlarges, sometimes reaching the size of an infant's head. These growths are unequal, hard, bossed, and elastic until they reach the skin, when the process of necrobiosis begins and they

become soft and fluctuating at the centre. When the abscess opens there remains a cavernous ulcer which at first sight may readily be confused with cancer. The gummata, however, are often bilateral and multiple, and are not accompanied by the characteristic carcinomatous adenopathy. In doubtful cases the therapeutic test should always be made. Iodide of potassium has in a number of cases caused the rapid disappearance of such ulcers.

Jacquinot [45] states that stricture of the rectum is usually of syphilitic origin. The stricture is either circular or may involve only a portion of the bowel. It forms a cone with its base downward. It grows upward and usually involves the lower part of the rectum. A vegetative ulceration of the mucous membrane is usually present. Treatment consists in dilatation followed by rectotomy; in rare cases colotomy is necessary.

Le Dentu [287] treated a case of ano-rectal syphiloma by the formation of an artificial anus without deriving any advantage therefrom. In a series of 8 cases treated by Hahn in a similar manner amelioration was noted in but 3.

SYPHILIS OF THE TONGUE.

Fournier [17] contributes an elaborate article upon syphilis of the tongue. He states that in an experience of twenty-seven years he has seen but 37 instances of lingual chancre. The chancre is usually found upon the upper or anterior portion of the tongue. It commonly takes the erosive form, exhibiting the essential characteristics of the ordinary chancre. There is a tendency to rapid, spontaneous healing.

The secondary tongue eruptions are classed as humid or dry, the former being much more frequent. Of the humid syphilides the mucous patch is the type. These lesions may be erosive, papulo-erosive, papulo-hypertrophic, or ulcerative.

The erosive type develops in the great majority of syphilitics and is subject to frequent recurrence. The lesions may be dark red or may be characterized by a diphtheroid appearance; their smooth surface is in marked contrast to the villous normal surfaces. They may be single or multiple; on the sides of the tongue they may form fissures or rhagades, producing lesions perpendicular to the long axis of this organ. They indicate an actively contagious state of the disease, but in themselves afford absolutely no

sign which will enable the observer to distinguish them from the ordinary aphthæ. They may be exceedingly minute, and hence difficult to find.

Papular eruption is rarely found on the tongue. When it manifests itself here it may assume a diphtheroid aspect or the papules may become hypertrophied, presenting what is called the "toad-back tongue." The ulcerative type is in no way characteristic, and diagnosis based upon the lesion alone is impossible.

The dry syphilides form small patches upon the tongue, readily recognized by their smooth, shining surface, due to the disappearance of papillæ. These lesions cannot readily be seen until the tongue is wiped with a towel or other absorbing fabric; the eruption is then found absolutely smooth and exhibits no change of color when it is touched with nitrate of silver. There is no trace of erosion. This form of syphilitic glossitis may develop at any period of the disease.

Syphilides of the tongue are readily confounded with other lesions. Fournier calls particular attention to an eruption, heretofore unnoticed by syphilographers, which has been the cause of much misdirected therapeusis. He states that among syphilitics there is recurrent herpes of the mouth characterized by small erosions and identical in appearance with mucous patches. These lesions commonly appear some years after a methodical course of treatment which has apparently eradicated the disease. Small doses of iodide administered to syphilitics are absolutely without effect. After some days these lesions spontaneously disappear, to recur again at irregular intervals; these recurrences may persist for years.

This form of herpes is strictly analogous to the genital herpes described by Doyon, since it is absolutely independent of the original syphilitic poison and since it is distinctly aggravated by all forms of local irritation. Its recognition is very important, as otherwise a treatment not merely futile but positively harmful will probably be prescribed. Again, should a patient with such a lesion consult a physician in regard to marriage a mistake in diagnosis might lead to much needless suffering.

The treatment of the secondary syphilides of the tongue is both local and general. The acid nitrate of mercury is particularly commended as a local treatment. It is also necessary to keep

the mouth absolutely clean and to abstain from alcohol and tobacco. Borax and other slightly astringent mouth-washes are commended.

Tertiary manifestations are frequent upon the tongue, and are more commonly observed in men than in women. This is probably owing to the etiological bearing of tobacco and alcohol. These tertiary manifestations may appear in the form of a superficial cortical glossitis, revealed by a certain firmness of the surface to the touch and the dark, smooth, striped appearance of the mucous membrane; or there may be deep parenchymatous glossitis, manifested by tumefaction and extensive induration or alteration of the mucous membrane. These lesions yield not at all to specific treatment.

Gummatous glossitis may be superficial or deep. Two forms appear; the confluent, in which the number of gummata is so great as to produce considerable deformity and great swelling, and the phagedenic, which is comparatively rare. Two varieties of the latter form are described: the serpiginous, which usually extend toward the throat and may produce œdema of the glottis, and the terebrant, which may result in the destruction of the greater part of the organ. Gummatous glossitis yields much more readily to treatment than the sclerous forms of the affection. Iodide of potassium alone is frequently successful, whilst in the sclerous forms the addition of mercury is always required. As a topical application, a mixture of the iodide of potassium and tincture of iodine dissolved in water is recommended: Potassium iodide, 2 to 3 grammes (30 to 45 grains); tincture of iodine, 2 grammes (30 grains); water, 25 grammes (6½ drachms). Caustic should only be employed in sclerous glossitis, where fissures or rhagades exist. In the former case the nitrate of silver may be used; in the latter the part may be cauterized with tincture of iodine until the eschar is cast off; then the granulating surfaces may be dusted with nitrate of silver.

Hallopeau[3] reports the case of a patient suffering from severe syphilis affecting the tongue, who presented, in spite of thorough and prolonged treatment, vegetative and indurative outgrowths, and at the same time enlargements of the adjacent glands. The author at first made the diagnosis of epithelioma. The results of investigation undertaken by Goupil and the opinion expressed by Fournier led him to give up this diagnosis. Observation of

cases shows (1) that syphilomata of the tongue can persist and continue to proliferate in spite of energetic treatment; (2) that they may occur at the same time, both in the deeper portion of the organ and in the region immediately below the mucous membrane; (3) that they may appear as indurative and vegetative tumors; (4) that they may also assume the form of papillomatous outgrowths; (5) that they may be accompanied with adenopathy. They have been described under the name of "lingual sclerosis." This phraseology can, without doubt, be legitimately applied to the later stages of the disease; that of "vegetative syphilomata" is, however, more correctly used for the actual lesions.

TRANSMISSION OF SYPHILIS.

Hutchinson[806 July] believes that the rule of a two years' interval between syphilis and marriage in the case of a man appears, with very rare exceptions, to be trustworthy. He suggests, however, that careful study may show that a much longer interval must be enforced in the case of a woman. A case is reported in which it appears that a woman syphilitic before marriage retained the power of producing tainted children for upward of eight years. The husband was healthy.

Post[99 Dec. 19, '99] believes that a syphilitic man, if he has suffered from a mild form of the disease, can marry in two years, though the birth of children should not be sanctioned till a longer period has elapsed. For the severer cases marriage should not be permitted for a considerably longer time.

Mauriac reports an instance of syphilis communicated from the husband to the wife four years and nine months after primary infection.

HEREDITARY SYPHILIS.

Mauriac[100 Dec. 10, '99] states that hereditary syphilis may be acquired by transmission through spermatozoa, by placental transmission, or through the agency of an infected ovule. The disease is subject to caprices which careful investigation has not yet been able to explain. It is known that syphilitics at the height of the secondary period—that is, at the period most dangerous for transmission—may give birth to children perfectly healthy. *Per contra*, there are cases of transmission occurring ten or fifteen years after primary infection, at a time when such transmission is usually

regarded as improbable. It is conceded, as a general rule, that transmission is particularly probable and fatal when the disease of the parents is in its early stages and when both are infected; or, if only one is infected, when the mother is the one who is diseased. It is also well recognized that the power of transmission grows less and less with the lapse of time, and ultimately entirely disappears. Finally, it is known that specific medication not only successfully combats the disease in the parents, but greatly attenuates its virulence in the children, if it does not entirely preserve them from its ravages.

The mortality of hereditary syphilis is exceedingly high; according to Kassowitz, a third of all syphilitic children die before their birth, and among those who are born 34 per cent. die in the first six months of life. Intra-uterine infection manifests itself most feebly when it is dependent upon syphilis acquired by the mother during pregnancy. Hereditary syphilis may be transmitted to the second generation; transmission to the third generation has not yet been proven.

The syphilides of the hereditary disease do not usually appear before the third week of life. As to the succession of lesions after this period, whether they follow the first manifestations or appear independently of them, the time at which they break out or may break out cannot be determined. Up to the 18th year they are not uncommon, and cases are observed where even later the characteristic features of the disease are developed.

Hereditary syphilis has neither lesions nor symptoms distinctly characteristic; it offers all the manifestations of acquired syphilis with the exception of the primary lesion. The tertiary lesions are exceedingly precocious, and may appear at a time when the secondaries are at their height; hence distinction between secondaries and tertiaries is much more difficult than in the acquired form of the disease, and hence it is almost impossible to say at what periods the lesions of hereditary syphilis cease to be contagious. According to statistics of 100 children born of syphilitic parents, 70 to 83 perished at various periods of their life solely from the fact that they were infected with hereditary syphilis.

Fortunately, mercury and iodides are powerful remedies in this disease; they are efficacious during uterine life, they cure the first manifestations after birth, and their action seems to be pecu-

liarly satisfactory upon syphilitic infants and adolescents. Indeed, the rapidity and the power of these specifics in the hereditary disease is far more marked than in the acquired form of the malady.

Gamberini[84 Oct. 11] states that if both parents are suffering at the same time from secondary syphilis the offspring will usually exhibit the signs of secondary syphilis. If both parents are suffering from tertiary syphilis the offspring will either be sound or apparently sound, or will exhibit tertiary lesions. A mother suffering from secondary syphilis can bear sound children if the father is healthy.

Tertiary syphilis is not virulent, yet it may appear in children as latent or tertiary syphilides; it never exhibits itself in the form of secondary eruptions.

If the mother acquires syphilis during the period of pregnancy she may bear either a healthy child or one having the marks of hereditary syphilis. Syphilis acquired by the mother from the fœtus infected by the father may appear in the form of a secondary or tertiary eruption. Impregnation of a healthy woman by a man in the tertiary period of syphilis can never cause development of the secondaries in the woman.

Some of these statements of Gamberini are incorrect. If the syphilis of the parents is of the true tertiary type, the chances of transmission are extremely small, and, indeed, the birth of a syphilitic child should be considered as sufficient ground for a revision of the diagnosis as to the stage of the parental disease. The child is not more likely to exhibit advanced (tertiary) lesions than if the disease of the parents were distinctly secondary; a mother suffering from secondary syphilis is most unlikely to bear sound children, and the inference that she is likely to do so if the father be healthy is quite unwarranted.

Hutchinson[806 Apr.] reports a case illustrating a phase of the laws of hereditary syphilis. Both husband and wife suffered from syphilis, but recovered under two months' inunction treatment. Two years later there was a premature birth of a very small child. This child survived and showed no signs of syphilis. Three years after this birth another child was delivered. It exhibited no signs of syphilis till its 6th week, when characteristic manifestations of the disease were observed.

Fournier[81, July 17] finds that hereditary syphilis frequently produces dystrophic effects, characterized by slow development, low stature, and dwarfed physique, or by the imperfect growth of certain organs, such as the teeth, the testicles, or the ovaries. Again, it greatly shortens life by its general systemic effect, frequently no lesions being found on post-mortem examination. It also distinctly predisposes to the development of rachitis.

Andrews,[418, V.16] in an analysis of 120 cases of congenital syphilis in children, states that eruptions on the skin are by far the most common manifestations of the disease. This eruption usually appears in the form of a roseolous rash, of a symmetrical erythema, or of a papular eruption. Squamous syphilides and maculæ are also noted. The seat of eruption is about the buttocks. Snuffles was much more common than the lines and fissures at the angles of the mouth. Hydrocele, hernia, and general malnutrition are found in a large number of cases.

Hochsinger[84, Nov.16,'89] writes at length upon the prognosis of congenital syphilis in children. His deductions are drawn from observations upon 265 cases, 63 of which were observed for many years. He states that the three symptoms given by Hutchinson as characteristic of congenital syphilis are not of diagnostic value. These symptoms consist in malformation of the teeth, interstitial keratitis, and deafness. These combined conditions were found rather in cases suffering from scrofulosis or rachitis.

As characteristic signs of hereditary syphilis but few symptoms can be found; these especially relate to the physiognomy of the patient; thus, a small sunken nose, rhagades at the corners of the mouth and nostrils, abnormal thickness of the finger-nails, and undue length and irregularity of the cilia are practically the only constant conditions. Other signs given as diagnostic are variable and uncertain, although it cannot be denied that syphilitic children are usually anæmic and weakly, that puberty is delayed in them, that they are poorly developed, and that they are prone to infectious diseases. In so far as congenital syphilis is related to scrofulosis, no cases were observed where the former affection seemed distinctly to predispose to the latter.

In proportion to the length and thoroughness of the mercury treatment is the assurance against recidivity and the appearance of late tertiaries. The author feels that congenital syphilis, even

in its most severe forms, is a curable affection, which, if promptly recognized and skillfully treated, does not materially shorten the life of the individual. A belief is expressed in the transmission of hereditary syphilis to the second generation, and a case in point is reported.

It will require further evidence, and a great deal of it, to shake the well-founded belief in the correctness of the view which associates the typical Hutchinson teeth, keratitis, and deafness with hereditary syphilis. Jullien long ago expressed as to keratitis the same opinion as that now advanced by Hochsinger, viz., that it might be due almost indifferently to either scrofula, rheumatism, or syphilis; other syphilographers and some ophthalmologists (among them Schweigger and Soelberg Wells) have coincided in this view. Doubts have been from time to time thrown upon the relation to syphilis of the peculiar form of deafness (often without otorrhœa or other external manifestation) which has been described by Hutchinson, Hughlings Jackson, Dalby, and others. The pegged and notched central upper incision of the permanent set have also been attributed to struma, malnutrition, etc. I believe that both the keratitis and the deafness are strongly suggestive of syphilis, and that the true "Hutchinson" teeth are absolutely pathognomonic, but it is beyond all question that the existence of the "combined conditions" renders the diagnosis of inherited syphilis as certain as anything human can be.

Barthélemy $_{\text{July 16}}^{8}$ made 28 autopsies on syphilitic fœtuses; in 14 of these no macroscopic or microscopic changes could be discovered, although life was undoubtedly destroyed by the syphilitic disease.

Fournier $_{\text{June 18}}^{3}$ presented for Cathelineau a report showing the presence of mercury in the viscera of a fœtus born of a syphilitic mother who had taken mercurial treatment.

Ozenne $_{\text{June 15}}^{24}$ had under observation a case of latent infantile syphilis which had been treated for some time for infantile paralysis, the typical symptoms of this latter disease, together with the continued fever, being present. Iodide and mercury treatment produced a complete cure in a month.

Cheminade $_{\text{Dec.}}^{287}$ reports a case of late hereditary syphilis characterized by gumma of the pharynx. The patient was aged 27, and presented the typical dwarfed, shrunken physique of inherited syphilis. Together with other accidents attributable to her disease,

she suffered from gumma of the pharynx, which the reporter diagnosed as syphilitic because of its circular form, its median position, and its pharyngeal seat, agreeing with Mackenzie that these features are found only in late hereditary syphilis.

Hudelo,[287 Oct.] in a contribution upon the lesions of the liver in hereditary syphilis, thinks that there may be, in the first place, a simple congestion without induration and without gummatous products, or the liver may become enlarged, heavy, of globular appearance and yellowish color. The whole liver may present this appearance or only portions of it may be involved. Gummatous manifestations may appear in the liver, but are rare in hereditary syphilis. These gummatous nodules may be associated with interstitial lesions, or there may be a true hepatitis associated with nodular syphilomata.

Railton[90 July] reports a case of congenital syphilis in which, at the age of 9 years, the spleen was found to occupy the whole of the left side of the abdomen, extending downward below the anterior superior spine of the ileum.

Mercurial inunctions and iodide of potassium failed to affect it. The next child in the same family, two years younger, had snuffles, rash, and, at the age of 7, typically notched and pegged upper incisors and rickets. The third child, two years younger, had snuffles, rash, and at the age of 2 years became hemiplegic on the right side. Two younger children were born alive and both remained well. The birth of the eldest had been preceded by two still-births.

Lannelongue[14 Feb.] reports a case of syphilitic sarcocele, hereditary in nature, successfully treated by calomel injections employed, according to the formula of Scarenzio, in minimum doses to its maximum effect. The reporter holds that hereditary syphilis manifests itself in the testicles more frequently than is generally supposed, that the symptoms of this affection are well marked and unmistakable on careful examination, and that early treatment is of cardinal importance for the preservation of the virile faculty and the physical and moral development depending thereon.

Fournier[824 May] asserts that there exists a rare form of tertiary syphilide absolutely analogous to lupus erythematosus, and that this manifestation of hereditary syphilis may appear after a patient has attained the age of 25 years, even though there has been no previous sign of inherited disease.

Euthyboule [212 Jan.] reports a case of late hereditary syphilis, remarkable from the fact that the characteristic eruption recurred periodically in the spring for ten years. This, taken in connection with other similar cases, notably those of Leloir and Horand, would seem to show that the spring exerts a decided influence in exciting the external manifestation of the syphilitic condition.

Conceptional Syphilis.—Fournier [212 Feb.] states that the inoculation experiments of Caspari and Neumann proved conclusively that the apparent immunity of the mother, who has borne a child syphilitic by its father, against the contraction of the disease from her offspring, is due to the fact that she has already been infected by syphilis during the intra-uterine period of the child's life. Thus, conceptional syphilis is to be classed with the hereditary form of the disease, since there is here no primary lesion.

Conceptional syphilis may remain latent for years. After eighteen years an outbreak of tertiary syphilis has been observed. Again, the disease may manifest itself at a very early period. It may appear in the second or third month of pregnancy. Manifestations of syphilis have been observed as early as the thirtieth day. Sometimes these manifestations do not develop until after delivery.

Merz [862] reports a case which seems to be another of the so-called exceptions to Colles's law. A healthy woman married a man who, five years before, had become infected with syphilis. He suffered from frequently recurring secondary symptoms, and two months after marriage had an eruption of mucous patches. Eight months after marriage an apparently healthy child was born; after two weeks, however, mucous patches were observed in its mouth. These healed under appropriate treatment. A chancre, however, developed upon the left breast of the mother, and this was followed by secondary symptoms.

For many years cases have been occasionally reported, purporting to be exceptions to the law of Colles, but so far as I know not one of them is sufficiently full and accurate to exclude the possibility of coincidence. For example, an ulcerated nipple in a woman already infected might well assume a suspicious appearance, and the relation of cause and effect might easily be misinterpreted. We have all seen ulcerating syphilides of the genitals almost indistinguishable pass the primary lesion. Cochet (see page 12) has

just reported two such cases. The fact is, as I have said elsewhere, that I know of no other statement in reference to disease which is at once so sweeping and comprehensive and yet so completely substantiated by clinical experience as the assertion first made in 1837, by Mr. Colles, that a syphilitic child is never known to infect its own mother. The cases of Cazenave (1847), Cocchi (1858), Müller (1861), Ranke (1878), Guibret (1879), Scarenzio (1880), and Zingalès (1882) are all defective in important particulars, though they are the strongest yet published. It is probable that the law is one of almost invariable application.

TREATMENT OF SYPHILIS.

Abortive Treatment.—At the Tenth International Medical Congress[697 Sept.] it was generally agreed, Neumann demurring, that excision may possibly abort syphilis. De Ehlers (Copenhagen) read a paper based on an experience of 37 excisions, in 32 of which definite results were obtained. In 9 cases the effect was positive, in 23 negative. In the 9 cases with positive effect the age of the chancre, dating from the time of infection, was less than 21 to 25 days. In cases in which the chancre has been excised, the course of the syphilitic infection is decidedly more benign; in 89 per cent. of the cases of excision the syphilis is mild, whereas without excision its course is mild in only 64 per cent. As to whether the second period of incubation is prolonged by excision, the speaker expressed a doubt; the average in his cases was fifty days instead of forty-six days, when excision is not practiced. Theoretically, the recent bacteriological researches of Bouchard, Chauveau, and others, which show that the number of pathogenic organisms is of great importance in determining the intensity of the infection, afford a strong argument in favor of the earliest possible excision of the initial lesion in syphilis. At the same time, we must not lose sight of the uncertainty of the result, and should not promise the patient too much.

Peroni,[1 Aug.] by means of electrolysis applied to the initial sclerosis of syphilis, claims to have been successful in aborting constitutional manifestations of the disease in 21 cases out of 29. This treatment must be applied before the glands are enlarged, and is most successful when employed within the first seven days of the appearance of the sore. The part is disinfected by soaking in a

solution of corrosive sublimate, 1 to 1000, for twenty minutes. Anæsthesia is then produced by cocaine and a small, diamond-shaped lance attached to the negative pole of the battery is thrust into the healthy tissues ⅜ inch from the edge of the sclerosis and about half that depth beneath it. The current is then closed and allowed to pass for several minutes. The entire diseased area may be destroyed at a single sitting.

Ingria [152 Apr.11] holds that when the initial lesion of syphilis is observed early, and is so located that excision is readily performed and can give rise to no subsequent deformity from cicatrization, this operation is indicated. Where excision is contra-indicated the thermo-cautery should be employed. This method is exceedingly uncertain, and seems to exercise no alleviating influence upon the infection in case secondaries appear; but when practiced before induration is observed it is rational, and, though proof on this point is not possible, would seem to be followed by some measure of success.

Leloir [100 Aug.14] believes that excision of a chancre may be undertaken with the idea of aborting syphilis when the sore is seen immediately after its appearance; when it is so placed that excision is easy; when there is no lymphatic enlargement; when there is but a single chancre or, if the lesion is multiple, when all are accessible to the treatment. If the subject is albuminuric, diabetic, or subject to any diathesis, excision is not advisable. The re-appearance of syphilomata at the seat of operation is exceedingly rare, the wound healing kindly and leaving a very slight cicatrix. As to the probability of aborting the general disease, this is exceedingly uncertain. In one case, in which the chancre was excised almost immediately after its appearance, the secondary symptoms developed at the regular time. In this instance eradication was not sufficiently thorough. This was proved by microscopic examination of the portion removed. The observations of Auspitz, Unna, Langenbeck, Rydygier, Kolliker, Pick, Pospelow, and others, all show that it may be possible to abort syphilis by the prompt removal of the primary sore.

The papers read at the Tenth International Medical Congress in regard to the treatment of syphilis showed that Kebner, Diday, and Petersen are opposed to continuous treatment, and favor treating the cases only when symptoms arise. Haslund, Lang,

Neisser, and Neumann favor continuous treatment from the beginning. Haslund employs inunctions; Lang, injections of the oleate of mercury; Doutrelepont, injections of salicylate of mercury; Leloir, regularly intermittent inunctions, beginning when the secondary symptoms appear and continuing for four or five years.

Kaposi [113] believes that the excision of the primary sore is as unscientific in theory as it is unsuccessful in practice, while operation upon the visibly enlarged lymphatic glands is equally to be rejected, since anatomical preparations prove conclusively the impossibility of obliterating or removing all the channels by which the poison may reach the system at large. Thus, Zeissl and Horoivitz have shown by means of injection preparations that the lymphatic system of the penis is most extensive, and that it has direct communication with the vessels and glands in the interior of the pelvis. The successful cases which have been reported are probably instances wherein the initial sore was either not syphilitic or where there was spontaneous resolution, as it is universally recognized that lesions exhibiting typical induration at times disappear without development of the secondary symptoms.

If Finger's assertion be correct (see page 2), and if the innocuity in the primary stage be due to tissue-products of the virus in the circulation, the infected foci being still strictly localized; and if, further, the severity of the syphilis has any relation, as he claims, to the dosage of the virus, excision of the primary lesion becomes not only a warrantable, but a logical and proper proceeding. Some years ago, basing my opinion simply on clinical experience, I said (Corriel on Syphilis, Am. ed., p. 106) that the evidence in favor of excision was sufficiently conclusive to warrant its adoption in most instances. In the new light which bacteriology is throwing upon this disease in all its stages, there would seem to be more reason than ever before to adopt excision as a routine practice whenever the situation of the sore admits of it.

Leloir does not now give mercury before the secondary eruption, since long experience has proven that early treatment possesses no advantages. When the secondaries are developed for two or three weeks, from ½ to 1 drachm (2 to 4 grammes) of mercury is administered daily by inunction. After a rest of one week inunctions are renewed, and the treatment is continued for ten months; at the same time the local eruptions are subject to

proper application. If cutaneous syphilides are multiple and rebellious, sublimate baths, 2 drachms (8 grammes) of bichloride to a bath, are employed. After ten months mercury inunctions are administered for periods of ten days, after which there is a period of rest varying from three weeks to two months. Purgatives, sudorifics, and exercise are now recommended. If the patient complains of pain or cephalalgia, iodide of potassium and bromide of ammonium should be administered.

Toward the third year it is still desirable to give a ten-day course of inunction every three months.

During the third or fourth year, if no manifestations of the disease have appeared, it is enough to prescribe a ten-day course of inunction twice a year.

In regard to the constitutional treatment, Kaposi[113] strongly insists upon the point of not administering specific medication until the development of roseola absolutely establishes the fact that syphilis is present. According to the natural history of the untreated cases of syphilis, there is an eruptive period which seems to run a physiological course. Within a few months all these manifestations disappear, even though there is no treatment. After some weeks or some months, during which the patient is perfectly well (and this is termed the latent period of syphilis), there is either recidivity or the patients remain entirely well. If recidivity occurs the lesions are now noted in the deeper tissues, such as the muscles, the bones, and the fasciæ. If treatment is adopted from the time the chancre is diagnosed, the physiological course of the disease is altered. There is frequently no primary eruption period, but the deeper lesions develop often with great intensity at the period when the skin eruption should appear. Not infrequently symptoms of brain involvement are noted.

Rupf has shown that brain syphilis is exceedingly common as a sequel to the anticipatory treatment of syphilis. Many practitioners begin the constitutional treatment as soon as there is general glandular involvement. Kaposi is not in accord with this practice.

In regard to the constitutional treatment of syphilis there are practically but two drugs, namely, mercury and its various combinations and iodine and its combinations. Mercurial ointment, administered in the form of inunctions, is *par excellence* the remedy

against syphilitic manifestations. Administered in this way, the drug penetrates into the subcutaneous tissues, is transformed into soluble albuminoids, and, coming into contact with the specific virus, destroys its power. It is finally eliminated through the capillary vessels of the salivary glands, the mucous membrane of the mouth, stomach and bowels, the liver, and the kidneys. The rubbing should not be pushed to salivation, but should be intermitted on the first sign of irritation in the mouth, as denoted by sponginess of the gums and thickness and ropiness of the saliva. This last sign is most readily elicited by causing the patient to open the mouth, when the salivary secretion can be seen drawn out in strings between the teeth and the tongue.

Certain people exhibit an idiosyncrasy toward inunctions; at times an eczema developing over the entire body. In these cases another method of treatment must be adopted. The dose administered is usually, to adults, 48 grains (3.12 grammes) gray ointment; to children, 10 grains (0.65 gramme) of the same preparation. Where the patient does not personally practice inunctions upon himself the quantity must be increased. Where symptoms are immediately threatening to life or to the vitality of an important organ, as, for instance, in brain syphilis, syphilis of the larynx or trachea, iritis, or optic neuritis, inunctions are the quickest, surest, and safest method of combating the local trouble. Should salivation occur the treatment must be stopped for five or six days, and the patient must use a mouth-wash containing a few drops of tincture of myrrh or tincture of rhatany. As prophylaxis against the development of salivation, the patient should be instructed to be scrupulously careful in keeping the mouth and teeth cleaned.

A very excellent way of applying mercury is offered in the emplastrum hydrargyri. This is not available for general treatment, but is particularly serviceable in cases of local ulcers. Many specific ulcers involve large surfaces which require protection against the entrance of germs, which might not only render more acute the local processes, but bring about systemic infection. The mercury plaster applied over this surface alleviates the pain, protects against infection, and acts directly upon the syphilitic virus.

Sublimate baths are exceedingly valuable and at times offer the only means by which the disease can be treated externally; thus, in some cases of syphilitic rupia, or when the patient is cov-

ered with hundreds of pustules, there being not sufficient surface for inunction, he should be put in a general bath to which has been added 3 drachms (12 grammes) of corrosive sublimate, and should be allowed to soak for several hours a day.

The subcutaneous injection of mercury must be placed in efficiency and safety below the employment of this drug in the form of inunctions. If injections are given, however, they should always be of soluble salts, since otherwise not only local pain and reaction is excited, but a preparation of the drug is introduced into the system which is absorbed partially and for a long period of time, and which has frequently caused violent salivation and has even resulted in death. Thus, a patient may receive an injection of suspended calomel, following which all syphilitic symptoms may disappear; shortly after, the symptoms of mercuric saturation may develop and the patient may perish, because it is almost impossible to prevent the steady and continuous absorption of the drug. If the soluble salts are employed this danger is not so great. Whether hypodermatic medication guards more fully against recidivity remains yet to be determined.

In the treatment by the mouth, calomel, sublimate, and protiodide of mercury are chiefly useful. Potassium iodide and tincture of iodine in soluble form are second only to the mercurial preparations. Indeed, in certain forms of syphilis, iodine and the iodides must take first rank; thus, in periostitis, night-pains in the head, joints, and bones, gumma and involvement of the intestinal canal, improvement is often noted only after iodine or its salts are added to the mercurial treatment.

Certain vegetable preparations have been extensively used and vaunted as specifics against syphilis. Some contain mercury, others act only as general tonics. One of the best known is Zitmann's decoction, which seems to be particularly serviceable in the late forms of syphilis.

The bath-cures are also important aids in the therapeutics of syphilis. Best of all are the iodine and the sulphur baths. Of the iodine baths, Halle, Darkau, Iwanica, and Lepik are chiefly to be commended. These are only valuable in the later forms of the disease. The most efficacious of all sulphur baths is that of Aachen; this seems to be particularly serviceable when employed in conjunction with mercury inunction.

The water-cure is only of service as an adjunct, or means of getting the patient in better general health. The warm baths are serviceable for a completed mercurial cure as a means of hastening and encouraging the elimination of the drug from the body.

In regard to the prognosis of syphilis, Kaposi insists upon the fact that it is an eminently curable disease. He considers that most cases of alleged recurrence are due to careless, unsystematic treatment in the early stages of the disease, or to a certain constitutional feebleness, dependent, for instance, upon tuberculosis or alcoholism, which prevents thorough recovery from the original lesions.

Fournier's experience has been so unprecedented, and his position as the leading syphilographer of the day is so generally conceded, that a statement of his views as to treatment is always of interest, even if it is but a re-iteration of previously-expressed opinions. He $\frac{100}{\text{No.103,'89}}$; $\frac{1}{\text{Mar.8}}$ again advises withholding mercury until we are sure that the chancre is a true initial lesion. Once begun, the mercurial treatment is to be kept up continuously for a number of years, with occasional interruptions of one to two months. This latter method will prevent tertiary accidents in from 90 to 95 per cent. of the cases. The proper length of time during which mercury is to be taken varies with the cases. Some patients never get well, are subject to constant relapses, and need to be treated all their lives. In most cases two years, at least, must be devoted to the administration of mercury; better, three or four years. After leaving off mercury, iodide of potassium should be administered, with alternating intervals of complete absence of medication. During the first year of iodide administration four courses are to be taken; during the second and third year, three. His usual method of treatment is the following: On the appearance of secondary symptoms he prescribes 5 to 10 centigrammes ($\frac{4}{5}$ to $1\frac{1}{2}$ grains) of the protiodide of mercury a day during six to eight or nine weeks. Then a pause of six weeks is made, and another six-week course is taken. During the first year four courses are gone through with; during the second, three; and during the third, two; after which the potassium iodide is given, 45 grains (3 grammes) a day for six weeks, and then pauses, as already indicated. In the meanwhile, general hygiene and tonic treatment is not neglected.

Hallopeau[245 Mar.] regards each manifestation of syphilis as a centre of multiplication of the virus—as a source of re-infection—which it is necessary to suppress. If we wish to exercise an energetic and profound action upon these accidents we should have recourse to the acid nitrate of mercury, which is such a heroic remedy in syphilis of the mucous membranes, but which may be rendered much less painful by the preliminary application of cocaine; or we may employ the sublimate in powder, the caustic action of which is most vigorous and should be carefully watched. Hallopeau has used it as an abortive treatment for the indurated chancre. Mild solutions of the sublimate (1 to 500, to 1000, 2000, or 3000) may be applied by means of pledgets of cotton to the affected parts and then covered with gutta-percha plaster, so as to constitute a permanent bath; these are most useful in all syphilitic ulcerations. Baths of the sublimate are employed where the lesions are extensive; ointments and plasters should be reserved for circumscribed manifestations.

Düring[365 No. 18; 25 July] earnestly opposes the employment of general treatment before secondary symptoms are plainly manifest; for in the coronary tubers there arises, not infrequently, a non-specific folliculitis or perifolliculitis, which in hardness may resemble a true chancre for weeks. The mental injury inflicted on a patient by a premature and unfounded diagnosis of syphilis, causing him to be in continual fear of relapses all his life, stands in no relation at all to the very doubtful benefit of early treatment of real syphilis.

R. W. Taylor[9 Dec. 7, '89] formulates the conditions in which it may be necessary or advisable to give mercury in the primary period as follows:—

1. Where the initial lesion, from its size, depth, or extent, causes much pain and discomfort, or interferes with the functions of parts; or, from activity of ulceration, threatens to destroy them (glands, clitoris, urethra, fingers, eyes, nose, lips, tongue, breast, or anus).

2. In certain of those cases where, from its situation, the chancre may lead to infection of others, such as the fingers of surgeons and midwives, nipples of wet-nurses, chancres of the tongues of infants, and on the lips of young, careless, and thoughtless persons.

3. When the enlargement of the lymphatic ganglia is excessive and causes inconvenience and impairment of locomotion or movement of the arms, or produces much discomfort and disfigurement (neck, submaxillary region, elbows, and groins).

4. In all cases where chancres are complicated with a pyogenic (perhaps microbian) infection, attended with pain, fever, and perhaps typhoidal symptoms (chiefly on the fingers, but also, though rarely, on the nipple and mammæ, and sometimes on the penis).

5. In all cases where married or sexual relations render the early disappearance of the chancre imperative.

6. Where the extreme anxiety and unreasonable impatience of the bearer render it imperatively necessary.

7. In those somewhat exceptional cases in which severe cephalalgia, neuralgia, and pains in bones, joints, and fasciæ are precocious.

These indications are certainly very liberal, and in my own practice I should hardly regard No. 6 as constituting a sufficient reason for beginning treatment.

Buret[824 July] advises during the primary stage of syphilis a general tonic and hygienic treatment. When the secondaries are well established he believes the protiodide and the other salts frequently prescribed should give place to the bichloride, since it does not cause colic, excepting when given in very large doses, and goes into the system without further change. Van Swieten's solution is a very admirable form in which to administer the treatment, but unfortunately the taste is not agreeable.

When the stomach is not tolerant of the drug, inunctions or hypodermatic medication may be employed. In the secondary period the internal treatment is continued for three successive months. At this time, if the manifestations are less marked, three weeks are allowed to elapse without treatment. Then for two more months treatment is resumed, followed by an interval of two months without medication. This intermittent treatment is continued for one or two years, according to the needs of the case. In general, the first year of syphilis requires six months of treatment and six months of repose.

At times it is necessary to combine mercury with the iodide. For several years the iodide should be administered for two months

at each change of season. In the tertiary period the iodide should be administered in large doses if symptoms require; usually 15 grains (1 gramme) a day for two months in the spring and two months in the autumn are sufficient, but in cases of gummatous development the dose must be increased and must be combined with mercury inunctions. The mixed treatment is also required by exostoses. As for the local treatment, the chancre is dusted with powdered calomel. Mucous patches heal promptly under the internal administration of chlorate of potash and the topical application of nitrate of silver. Mercury ointment should be applied to erosive syphilides, and continued warm baths are useful where ulceration is persistent.

Guntz [22 Feb.] calls attention to the fact that the use of mercury in diabetic syphilitics is attended with danger. It is generally believed that mercury taken into the system diminishes the amount of sugar in the urine, but this diminution is simply a suspension of the conversion of albumen into sugar. With lessened amount of sugar eliminated, there is an increased amount of albumen. The chromate preparations, he states, are best adapted for the treatment of cases of syphilis and diabetes combined.

Besnier [212 Aug.] states that it is very important to bear in mind the fact that after the fiftieth year the primary and secondary lesions of syphilis are so slight as to frequently escape attention, but that it is of prime importance to discover such lesions, since, unless the specific treatment is begun early and continued faithfully, the disease may manifest itself with great virulence in the second or fourth year after contagion.

Jullien [13 May] notes that dilatation of the stomach is frequently observed in the later stages of syphilis, and believes that this is due, in part at least, to the internal administration of specific medicines and to consequent pathological changes in the liver. In these cases he advises the hypodermatic use of mercury and also the administration of the iodide, dissolved in milk, by the rectum.

Haines [80 July] claims for cascara amarga brilliant results in tertiary syphilis, especially in those forms where necrotic processes combined with profound cachexia interdict the use of mercury and potassium iodide.

Curtis [771 Sept.] holds that $\frac{1}{8}$ grain (0.008 gramme) of pulverized

ipecac to $\frac{1}{16}$ grain (0.004 gramme) of biniodide of mercury will effectually prevent the unpleasant action of the latter drug upon the mucous membranes. Tablets containing the drugs in the proportions given above may be administered, 8 to 12 a day, without producing any gastric or enteric symptoms. Curtis does not administer iodide, but continues the biniodide of mercury treatment for two years.

When iodide of potassium is administered, the skin eruptions and unpleasant symptoms may be combated by ordering hot baths morning and evening.

Stelwagon, $\frac{245}{Dec.}$ in a paper on the alleged tolerance of the iodides in late syphilis, reviewed the question which I raised last year, taking the same ground that I did, namely, that there was no evidence that the tolerance was more marked in syphilitic than in non-syphilitic patients. A number of cases were reported to illustrate how frequently the iodide was not well supported. His own experience corresponded with the observation of Haslund, that large doses could be given in psoriasis with an equal freedom from the production of iodism seen in syphilis.

Taylor said, in the discussion, that Wood's conclusions drawn from nervous cases were faulty. The iodides were equally intolerable to certain syphilitics and non-syphilitics alike, but we are apt to give up their use too early when the first symptoms of coryza, etc., show themselves. Sometimes the drug could be pushed without danger. Greenough said some patients would bear large doses when they could not take small ones. Denslow added his experience in one case in which there was undoubted syphilis, and in which the patient could not stand even a 2-grain (0.13 gramme) dose of iodide of potassium.

Quinquaud $\frac{3}{Aug.13}$ believes that a calomel plaster offers a ready and sure method of bringing the system under the influence of mercurials. This plaster is made as follows:—

℞ Diachylon plaster, ...	3000 parts.
Sublimated calomel, ...	1000 parts.
Castor-oil, ...	300 parts.

Before applying it the skin should be thoroughly washed with soap and warm water. A square decimetre (16 square inches) of the plaster is applied to the surface and left on for eight days. It is then removed and re-applied after an interval of eight days. Examination

of the urine showed that the mercury thus applied was absorbed. By employing not more than a square decimetre there is practically no danger of salivation. By doubling the dose—that is, the size of the plaster—a slight stomatitis is sometimes excited.

Watraszewski $_{\text{Dec.,'99}}^{824}$ finds that the advantages claimed for the hypodermatic employment of mercury chemically combined with other parasiticides have not been realized in practice. The general and local reaction excited by injection of mercuric salts is in direct proportion to the quantity of such salts injected, and, moreover, the specific action of each drug is immediately dependent upon the number of mercuric units contained in a given quantity of the medicament. Hence the choice for hypodermatic medication would naturally lie between calomel, yellow oxide, and metallic mercury. Calomel has lost many adherents from the fact that violent poisoning frequently follows its employment, Runeberg having collected 7 fatal cases. Experience, however, has shown that dangerous symptoms can be avoided if the dose does not exceed 0.05 gramme ($\frac{4}{5}$ grain).

Metallic mercury, as usually administered,—that is, in the form of gray oil,—is even more dangerous, for, not only is there great danger of systemic poisoning, but fat embolism of the lungs has been noted in a number of cases.

The yellow oxide seems safer than either of the above-mentioned preparations. In doses of 0.04 gramme ($\frac{3}{5}$ grain) it has been given thousands of times in the last few years, and without once exciting alarming symptoms.

The choice of a menstruum in which the yellow oxide may be held in suspension is important. In experiments on animals it was found that dangerous embolic pneumonia was excited when oily fluids were used. When mucilage was employed minute disseminated embolic foci were noted. These gave rise to no serious symptoms, and readily underwent spontaneous resolution.

A mucilage, made of gum arabic 1 part, water 120 parts, holds the yellow oxide in suspension, is not irritating to the tissues, does not decompose the mercuric salt, and excites no general disturbance.

Szadek $_{\text{Mar.27}}^{8}$ believes that salicylate of mercury in the form of intra-muscular injections is exceedingly valuable in the treatment of all stages of syphilis, but that it is especially serviceable in the

secondaries and in the mild forms of recidivity. For cure, eight to twelve injections are required, administered within a period of from twenty to forty days. The general condition of patients treated by injections of this salt remains unaffected; stomatitis rarely occurs, and when it does appear is seen only in its lightest form. Local reaction is very slight and abscesses are never formed.

Hartmann [20] asserts that the black oxide of mercury suspended in pure olive-oil forms an excellent intra-muscular injection for the treatment of syphilis. It is to be preferred to calomel from the fact that it causes but slight reaction and only temporary pains.

Balzer Thiroliox [31] prefers the benzoate of mercury as a hypodermatic medication. This salt coagulates albumen far less than other combinations of mercury, and hence it exercises a less energetic action upon the cutaneous nerve-filaments. It does not seem to cause gastro-intestinal complications or abscesses, and no cases of gingivitis ever went on to marked salivation. The injections may be practiced in any part of the body, but least painful in the back. The objections to this salt are that many injections are required, that it deteriorates on keeping, and that it sometimes causes induration at the point of application.

Szadek [34] warmly commends the thymol acetate of mercury as a means of treating syphilis by hypodermatic injection. It causes but slight pain, very little local reaction, and acts promptly.

Löwenthal is practically of the same opinion, believing that intra-muscular injections of thymol acetate of mercury cause rapid disappearance of syphilitic manifestations, even if comparatively few injections are given, and that recidivity does not frequently occur. When cocaine is incorporated with the injection there is really no pain. Abscesses are not developed, marked infiltration rarely appears, and salivation is almost unknown excepting in patients having bad teeth. Enteritis has never been observed.

Vidal [46] recommends the use of cyanide of mercury, 10 grammes (2½ drachms) to 150 grammes (4 ounces 6 drachms) of distilled water, for hypodermatic injections. Of this he injects ½ gramme (7½ grains) into the muscles of the thigh; no abscesses were formed, excepting in a few cases where the injection was placed just beneath the skin instead of into the muscular tissue. There was not a single instance of stomatitis or of mercury poisoning.

Vogeler[4] considers that subcutaneous injections of calomel are the most successful of all means of treating syphilis; the advantages of this method are that it is clean, cheap, convenient, reliable, free from pain, does not cause abscesses, and is safe, if the physician is prepared, on the first sign of mercuric intoxication, to incise freely at the seat of injection, and to thoroughly wash out all the drug which is not yet absorbed.

Klotz[245] prefers the yellow oxide to other insoluble preparations of mercury. The injections are repeated at intervals of about ten days, and are given in a number of series, each averaging about six injections, separated by intervals of weeks or months.

H. D. Cramer[60] treated a syphilitic lesion on the forefinger of a woman with a local wash of ½-per-cent. sublimate solution; marked salivation followed, accompanied by slight albuminuria and evidences of mercury in the urine. For the appearance of roseola iodide of potassium was administered; but, as this was not well borne, 2 grains (0.13 gramme) of calomel were administered hypodermatically, and the injections were repeated at intervals of eight days. After the fifth injection all manifestations of the disease disappeared. Immediately following the sixth injection violent salivation and stomatitis developed. The patient suffered later from acute enteritis and marked albuminuria, and narrowly escaped death. This seemed to be a case rather of idiosyncrasy against sublimate than of peculiar reaction to all mercuric salts. It would be advisable in all such cases to investigate as to whether absorption and elimination of the mercury were advancing with equal steps immediately after the first injections, to administer iodide of potassium at the same time the injections are made, and to allow a longer interval to elapse between each mercuric injection.

I am of the opinion that this whole matter of mercurial hypodermatic injection has been greatly overdone. The true value of the method is in cases of *emergency*, in which there seems to be no time to wait for the somewhat slower effects of inunction or fumigation. It is worse than useless to suggest it as a routine method in the treatment of syphilis, particularly in private practice, viz., accuracy in dosage. The chief claim in its favor, as a plan of continuous treatment, has been shown to be unfounded on account of the variability in its absorption; while in the best hands, and with

all antiseptic precautions, it has produced abscesses and painful nodules which have given great annoyance. It is not unassociated with danger of embolism and of pseudo-paralysis. It occasionally salivates violently and unexpectedly, apparently from sudden absorption from accumulations at the point of injection. I never think of using it in ordinary cases, and very rarely use it under any circumstances.

Sarowsky,[1009] in a careful investigation as to the effect of hot baths upon the elimination of mercury, formulates the following conclusions:—

1. Tepid and hot-water baths, as well as hot-air baths, invariably increase the elimination of mercury in the urine.

2. This elimination is in direct proportion to the elevation of the temperature to which the patient is exposed.

3. When the organism is thoroughly mercurialized, the systematic employment of heat will cause entire elimination of the drug.

4. When in the course of treatment the drug is no longer thrown off, the hot baths immediately cause it to re-appear in the excreta.

5. Stomatitis can be cured more rapidly by the application of heat than by any other means; hot-air baths, by inducing copious perspiration, promote the elimination of mercury through the sweat-glands.

6. The simultaneous employment of mercury and heat is more efficacious than the employment of the drug alone.

7. In patients with diseases of the vascular system hot water must be employed with very great caution.

Ehrmann,[45] while objecting to the employment of mercurial baths for the treatment of constitutional syphilis, on the ground that it is not possible to introduce in this way sufficient mercury into the system, highly commends this means of treatment in local manifestations of the disease. In papulo-pustular syphilides, papular and ulcerative forms of the disease, ulcerating gummata, and moist papules, the baths are most serviceable, particularly in cachectic patients, who do not well support a vigorous mercury treatment. The tubercular eruptions and gummata involving the skin also heal under this method of treatment.

Where certain regions of the body are involved, partial baths

are recommended: thus, in manifestations upon the genitalia the sitz-bath is useful, and in plantar or palmar psoriasis, or syphilitic onychia, the hands or feet alone may be submerged. Gaertner and Ehrmann warmly commend sublimate electric baths. Examination of the urine showed that there was rapid absorption of mercury. They conclude that the amount of the drug absorbed is proportional to the strength of the current and the length of time during which its application is continued; they also believe that accurate dosage is possible.

Lustgarten,[760] in discussing the use of hot baths and hot springs in the treatment of syphilis, states that the chief therapeutic benefit derived from the springs is the hot bath itself. These baths accelerate elimination by mechanically removing epidermis, and, by producing a more active circulation of the skin, facilitate the absorption of mercury.

Fournier particularly advises these hot baths during the intervals of an intermittent treatment of syphilis. The sulphur baths do not differ in their action from those of indifferent springs. The chloride-of-sodium and iodine-brine baths seem, however, to decidedly increase oxidation.

Much of the advantage derived by patients from visiting baths is no doubt due to climate. Where, in spite of rational treatment, relapses occur in quick succession; when the disease assumes a malignant form, and the patient becomes intolerant of specific treatment; when there is marked and obstinate involvement of the bones, glands, or nervous system, or when mercurial cachexia is developed, the sulphur and salt springs may accomplish good results.

Taylor,[59] states very emphatically his belief that there is not the slightest necessity to go to the Hot Springs, Arkansas (or, for that matter, to any other hot springs), to attain a cure, and that a very large number of cases that go there do so because they have not been properly handled at their homes.

Keyes believes that the chief virtue in the hot springs is that they help patients to assimilate a greater amount of drugs than they could elsewhere, and that in ordinary cases the treatment possesses no advantage whatever over the usual methods employed at home.

I thoroughly agree with these opinions, and I would add that

whatever benefit in exceptional cases is derived from the springs may, with equal certainty, be obtained by the liberal use of hot baths and diluent drinks at the patient's residence.

ORTHOPÆDIC SURGERY.

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NEW YORK.

POTT'S DISEASE.

Herzmann[22], showed at the Berlin Medical Society a case of peculiar curvature of the spine: The patient, a slater, aged 29, was without any hereditary taint, and had always been healthy as a child. As a youth he had some disturbances in his voice that prevented him from singing. Nothing wrong on the part of the lungs was ever observed. Even as regarded the vertebral column, his history was silent. He had never performed military service; he had never experienced anything abnormal, either whilst exercising in the gymnasium or at his work, which sometimes required considerable exertion. For some years he had suffered from slight nasal troubles, for which he had attended the polyclinic. Some time before he came under treatment, however, he had experienced difficulty in deglutition, and swallowing large lumps required a decided voluntary effort. On looking at the patient, it was observed that his neck was peculiarly arched forward. On laryngoscopic examination, a rounded tumor, covered with smooth mucous membrane, was found on the posterior wall of the pharynx, more developed on the right than the left. This completely prevented a view of the larynx. The tumor was of bony hardness to the feel, apparently in direct connection with the vertebral column, and quite immovable. By moving the head the tumor became slightly less prominent, but it always remained plainly to be seen and felt. By placing the patient in a suitable position, the whole larynx could be seen. It was normal. The tumor, as seen and also as felt, began immediately above the larynx and reached to the posterior nares, but did not fill the space. The movements of the vocal cords were normal. On examining the back of the

neck, a deep depression was observable, but by careful feeling the spinous process of the seventh cervical vertebra could be distinguished. Somewhat removed from this, and separated from it by a dense mass of connective tissue, the spinous process of the sixth cervical vertebra could be felt. It was above this process that the deep depression began, and it reached upward to the occipital bone. In the nose deviation of the septum and rhinitis were present. A peculiar observation was made on trying to feel the lateral processes of the vertebræ. The examination was very painful, especially about the middle of the neck. After the examination, which was made on the right side, the larynx was examined, when the right vocal cord was found to be paralyzed, but the paralysis passed away in a few days. In repeating the experiment of pressure, paralysis of the right vocal cord was again produced, but this time the paralysis was not quite complete. The left pupil was smaller than the right, but this was constantly so, and the speaker could offer no explanation of the fact.

FIG. 1.—STILLMAN'S ORIGINAL TRACTION FRAME. (*Western Medical Reporter.*)

Noble Smith [26 Aug.] describes a jury-mast which passes behind the head and has a band encircling the forehead. As a means of preventing the head from movement it is very serviceable, but it is not adapted to take the weight of the head off the inflamed vertebræ, and in this regard is inferior to a somewhat similar jury-mast described by Wallace Blanchard, [139 Feb.] which, in addition to the band passing around the forehead to steady the patient, has a plate passing under the occiput to serve as a support.

FIG. 2.—STILLMAN'S ORIGINAL HORIZONTAL TRACTION FRAME. (*Western Medical Reporter.*)

Chas. F. Stillman [115 Feb.] advocates traction on the spinal column upon a curved line as superior to traction in a straight line, and shows various forms of extension-frames for the purpose of making

traction in this manner, both in the upright and prone positions. The frames are used for purposes of exercise in lateral curvation, and as a means of combining rest with extension of the spinal column in Pott's disease.

Stillman's curved traction consists of a curved board, against which the patient leans, the curve being increased or diminished by means of a strong screw. Traction is effected by means of pulleys and weights attached to a sling passing under the chin and occiput. The arms may remain free for exercises with dumb-bells, elastic cords, or pulleys and weights, and slings may also pass under the axillæ, as in the Sayre method. It will readily be seen that if the posterior surface of the trunk is placed against the curved board, and traction on the spine is exerted by means of the pulleys and weights, the spine will be placed in a state of extension, the chest capacity will be increased and abdominal muscles strengthened, with a minimum of fatigue to the patient.

FIG. 3.—STILLMAN'S NEW FRAME.
(*Western Medical Reporter.*)

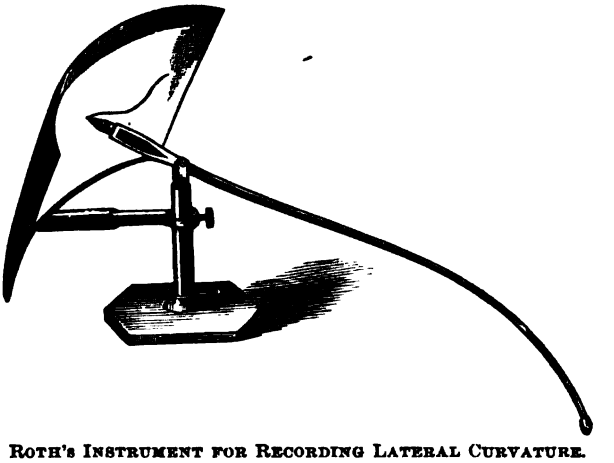
A second frame (Fig. 4) is constructed on the same principle, but a longer continuance of the traction is permitted while resting upon it than while using the upright form.

FIG. 4.—STILLMAN'S NEW HORIZONTAL TRACTION FRAME.
(*Western Medical Reporter.*)

LATERAL CURVATURE.

R. E. Roth [1000 Jan.,'89] describes an instrument for recording the degree of lateral curvature of the spine. He takes advantage of the fact that rotation invariably accompanies lateral curvature; so that if we make a tracing showing the differences of the back on both

sides of the spinal column, we have an accurate record of the extent of the deformity. But this tracing must be made under certain conditions, otherwise we are liable to error. The patient having had her clothing removed, and fastened around the hips, just below the trochanter, the surgeon stands behind, and corrects any irregularity of the hips by placing a suitable block, or a small book, under the foot; he then requests the patient to stoop forward, and to allow the hands to hang as much as possible. By this method all weight is taken off the spinal column, and any curvature and rotation that is now noticed will be of a permanent character, and cannot be either increased or diminished so long as the patient is in this position. In order to make a tracing, place



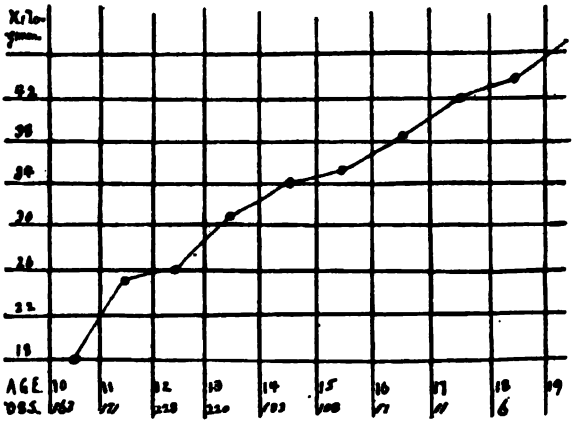
ROTH'S INSTRUMENT FOR RECORDING LATERAL CURVATURE.
(Transactions Second Intercolonial Medical Congress of Australasia.)

the stand of the instrument at some chosen spot on the spinal column, the chosen spot being the length of the long arm of the lever from the part we wish to trace. Now, on holding the stand firmly down with the index and middle fingers of the left hand, and on slowly moving the ivory point at the end of the lever with the right, the short arm, which carries a pencil, makes a correct tracing on the slip of paper, held firm by a curved piece of tin. The resulting tracing, which is reversed in size, will depend on the ratio of the short to the long arm of the lever; in this instrument the tracing made is one-fourth of the natural size. (See figure.)

Redard [55] has modified Lorenz's modification of Wolm's apparatus for lateral suspension in scoliosis. The apparatus consists

of two uprights, which have between them a hard-padded cushion rotating on an axle. Attached to this is a board, 1 yard long by 18 inches wide, which can be moved from the horizontal to the perpendicular position at will, and retained in position by means of wooden props. The patient lies on the board, the bulge of the protruding ribs resting on the cushion; while the corresponding arm passes over the cushion and holds firmly on to a handle. The hand on the concave side passes over the head and pulls strongly on a rope attached to the floor. The table is lowered by degrees, as the patient becomes accustomed to the pressure against his chest.

C. S. Scudder [99] has been testing the strength of the trunk-



SCUDDER'S TABLE SHOWING STRENGTH WHICH CORRESPONDS TO CERTAIN AGES AND HEIGHTS.

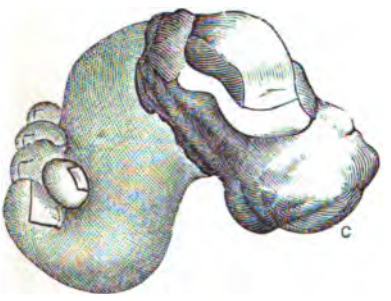
(*Boston Medical and Surgical Journal.*)

muscles in over 1000 growing school-girls for the purpose of determining the average natural strength at different ages. He has constructed a table embodying the results of his observations, and proposes that the strength of scoliotic patients be compared with this with the purpose of seeing whether their muscular strength is below that of the average Boston girl. There was constructed for these examinations a chair with hinged and movable back, at right angles to a seat slightly inclined from the floor and long enough for the child to comfortably rest the legs upon. The back, at the level of the shoulders, is connected by stiff iron rods to the handle of a dynamometer, graduated in kilogrammes and fractions. Attached to the back of the chair is an upright with a cross-piece,

movable up and down, by means of which the height, both standing and sitting, was taken.

Louis Bauer[786 Jan.] proposes the removal of the false ribs in those advanced cases of lateral curvature where the ribs press so strongly against the pelvis as to cause pain. The same idea was also suggested by Volkmann at the meeting of the Berlin Surgical Society, October, 1889.

Adolph Gorhan[8 June 12] describes what he calls "scoliosis ischiatica," the patients being men in whom a lateral curvature of the spine developed in consequence of severe sciatic pain, brought on by exposure to wet and cold. The body curved to the side opposite to the seat of pain, and the pictures given very closely resembled the position of sacro-iliac disease. The pains were relieved by ice and



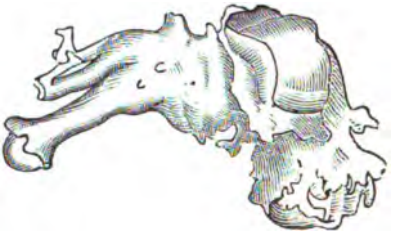


FIG. 1. FIG. 2.
CURIOUS DISTORTION OF THE FEET AFTER INJURY.
(*Centralblatt für Orthop., Chirurgie, etc.*)

later by galvanism, and on the disappearance of the pain the lateral curvature disappeared.

A. M. Phelps[7 Mar. 1] describes a simple way of preventing plaster and wax models from breaking, by coating them with a deposit of copper about 1 millimetre in thickness by the process of electro-deposition.

CLUB-FOOT.

Schreiber[738 May 1] describes some curious distortions of the feet following injury. In one case the patient was shot in the thigh, and a year after began to develop club-foot, which, after the lapse of thirty-eight years, became so severe as to require amputation. Examination of the specimen showed fibrous ankylosis in the ankle-joint. The head of the astragalus, which lay exposed and partially necrotic in an ulcerated spot the size of a dollar, was superficially destroyed throughout its greater part. The bone was

osteoporotic, and all the tissues of the foot were atrophied and had undergone fatty degeneration, the sinews being very hard to cut. The sole of the foot was so twisted under the astragalus that the head of the latter lay over in the wound, projecting downward, and the articular cartilage was more fibrous than hyaline. The toes and nails were atrophied. The metatarsus was twisted inward; the toes, with the exception of the second one, which was strongly bent upward, were flexed. The big toe was markedly valgus. Maceration of the foot showed remarkable changes in the skeleton,

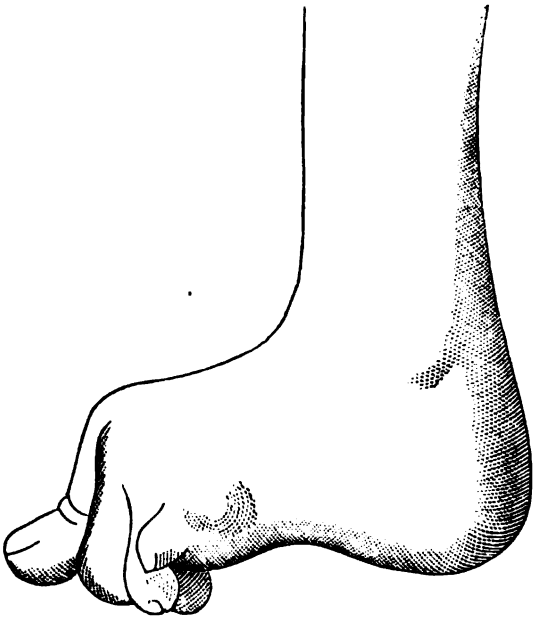


FIG. 8.—CURIOUS DISTORTION OF THE FEET AFTER INJURY.
(*Centralblatt für Orthop., Chirurgie, etc.*)

the bones being largely covered with osteophytes, and so blended together into one mass as to be in many cases unrecognizable. The general form of the foot and skeleton are well shown in the accompanying figures. (See Figs. 1 and 2.)

The second patient fell three stories and suffered severe concussion of his spine, which confined him to bed thirteen weeks. Two months after injury the toes of the right foot began to twist, and six months later those of the left became distorted. These conditions have remained stationary in the left foot, but have

gradually grown worse in the right until its condition is as shown in the cuts. (See Figs. 3 and 4.)

The only new method of treating club-foot which has been brought forward in the last year is that of T. N. Fitzgerald.[1000] His method is so radical that we quote, almost entire, his article on this subject. Fitzgerald holds very strongly that, whatever the etiology of club-foot may be, the principal factor is impaired nutri-

FIG. 4.—CURIOUS DISTORTION OF THE FEET AFTER INJURY.
(Centralblatt für Orthop., Chirurgie, etc.)

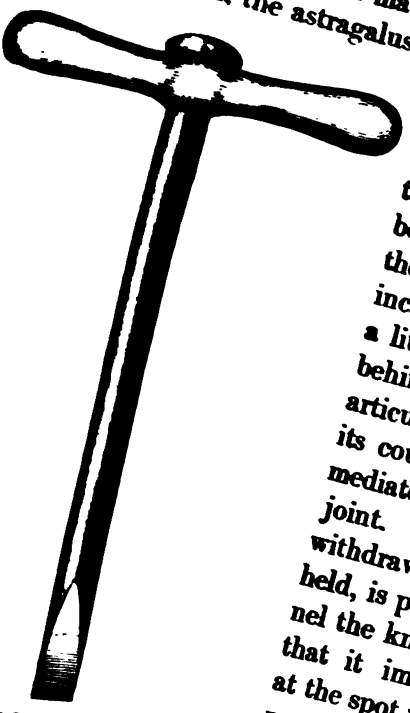
tion of the whole foot, and particularly of the bones. He describes the well-known distortions of the bones, and says: "What operative measures, then, can be adopted which may remedy these structural changes of form, these malpositions of the bones, without much risk to the patient, without weakening the foot, and by which, at the same time, nutrition can be improved? In another paper I have drawn attention to the marked effects of subcutaneous drilling

and gouging in improving the nutrition and vitality of the bone in cases of osteitis; and it occurred to me that if the poorly-nourished and malformed bones in talipes were sufficiently broken up subcutaneously, and at the same time all resisting fibrous structures were freely divided, the displacement could be rectified by a process of forcible molding together of the bones. In this way the osseous tissues, rendered soft and malleable, so to speak, would be capable of being crushed together or flattened out, as occasion required. Repair would then set in, new tissue be formed, and the improved position be rendered permanent, with a probability that the whole nutrition would be improved instead of impaired,—the foot strengthened instead of weakened."

Fitzgerald describes his operation as follows: "An Esmarch bandage is applied from the toes to above the knee. The following tendons are then divided: the tendo Achillis close to its insertion, the tibialis anticus just above the ankle, the tibialis posticus about an inch and a half above the inner malleolus, in the usual way. When this part of the procedure has been completed, it becomes comparatively easy to judge the amount of resistance offered by the contraction of the ligaments and fibrous structures of the sole. The fear that the divided ends of the tendo Achillis will not unite, if severed as directed, is, I am satisfied, groundless. It is simply necessary to see that the gap (no matter how large), which is occasioned when the parts are separated, is not obliterated by the too firm pressure of the bandage. To avoid this, I protect the ends and intervening space by a piece of card-board, over which the bandage is evenly and gently applied. This portion of the tenotomy being concluded, the plantar fascia, the calcaneo-scaphoid ligament, the deep ligaments, the abductor pollicis, and all resisting structures down to the astragalo-scaphoid articulation are freely divided. I often find it necessary to sever some of the anterior fibres of the deltoid ligament. If the artery and nerve come in the way, their incision does not seem to affect the issue in the slightest. Next comes the osteotomy, and, as this is the most important part of the operation, it will be well to be somewhat full in its explanation. The instruments used are an ordinary tenotomy knife, rather long in the shaft between the blade and the handle, and a chisel. The chisel is made of the finest steel, its cutting extremity is beveled like a V, similar to Macewen's

osteotome, and the stem is of a uniform size and perfectly smooth and round, and just sufficiently long that it can be grasped with the hand and at the same time perfectly controlled by the forefinger resting on and commanding the blade. To one accustomed to handling instruments, the importance of the chisel being of a manageable length can be easily understood, though at first glance it may seem an unimportant matter.

To proceed, the astragalus is first divided through its neck; to effect this, a valvular incision, just sufficiently large to admit the chisel, is made with the tenotome, obliquely down to the bone, the knife being entered on the outside of the foot, slightly inclined from above downward, a little backward and inward, behind the calcaneo-cuboid articulation, so that it passes in its course through the foot immediately in front of the ankle-joint. The tenotome being withdrawn, the chisel, firmly held, is pushed along the channel the knife has just made, so that it impinges on the bone at the spot where the astragalus may be said to narrow to a neck. The chisel enters this constriction, and with a little force, by pushing and twisting, it is manipulated in such a manner that the head or part of the bone which enters into the astragalo-scaphoid joint [illegible] tached from the body. The inner aspect of the [illegible] attacked, and the scaphoid freely broken up [illegible] calcis is now subcutaneously divided [illegible] behind the posterior articulating [illegible] into nearly equal halves [illegible] nutrition, and th[illegible] aim is to mold [illegible]



OSTEOTOMY CHISEL (HALF SIZE).
(*Transactions Second Intercolonial Medical Congress of Australasia.*)

to do this considerable force is required, and it is well to have the help of a trustworthy assistant, so as to prevent fracturing the tibia or fibula close to the joint or separating the epiphyses. The rotation of the tarsal bones may be assisted by enrolling the foot in a wet towel, or the member may be levered into position by means of a flat piece of wood firmly attached to the sole of the foot, and the os calcis forced into place. By these means, and the exercise of a little patience, it will be found that the foot can be nearly fashioned into good position. Any little fragment of the scaphoid that sticks out, or is unduly prominent, may be hammered back by a mallet, interposing a roll of bandage between the foot and the blow. All that now remains is to roll the foot in antiseptic wool, and apply firm but even pressure from the toes to the knee. The limb is put in a light trough-splint, with a foot-piece so adjusted that it keeps the foot in good position, *i.e.*, at right angles with the leg; the Esmarch tourniquet is then removed. In three or four days, when the superficial wounds are healed, I apply the little splint depicted in the diagram on the next page.

"Fig. 1 shows the ball-and-socket joint. Fig. 2, the foot-piece (B), on the outer side of which there is a small plate, so that the projection from the ball can be screwed into it, thus allowing the foot-piece to remain on the sole when the splint is removed. Fig. 3 is a full view of the whole apparatus. The foot that has been operated upon is firmly and evenly strapped to the foot-piece (B), and the limb is laid in the splint, which is carefully adjusted to the leg; the ball portion lying free in the socket is then screwed into the foot-piece; the foot is then turned to the desired angle, and is held in position by tightening the screw (C) in Fig. 2. For a fortnight the case requires careful watching, and should be seen almost daily, in the event of any undue pressure occasioning sloughing. At the end of this time, when the foot is taken down and examined, it may require some little readjustment, and should be put up again for another week. The whole splint, with the exception of the foot-piece, should now be removed every morning and gentle passive motion used, and the child may be permitted to walk on the foot-piece. At night-time the splint should be put on and the foot adjusted to the position desired.

"At first sight, this operation no doubt appears rough and

unsurgical from the amount of force that is required to twist the foot, but the same is the case with many other proceedings the utility of which is not in the least doubted. A question that naturally arises is, Whether there is not, in breaking up the scaphoid and chiseling off the head of the astragalus, a risk of separating the fragments from their attachments and nutritive supply, thus setting up necrosis? Such has never occurred to me, and I think the danger apprehended rather chimerical, provided

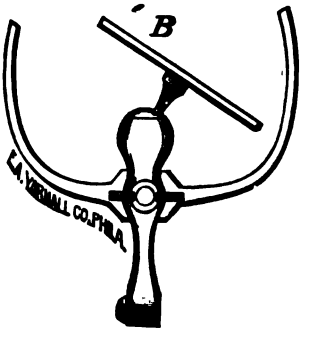


FIG. 1.—BALL-AND-SOCKET JOINT.

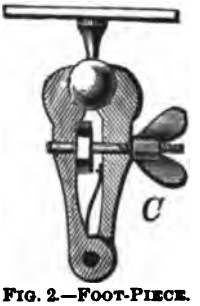


FIG. 2.—FOOT-PIECE.

FIG. 3.—FULL VIEW OF APPARATUS.

(*Transactions Second Intercolonial Medical Congress of Australasia.*)

that the cutting is strictly subcutaneous and that absolute cleanliness is rigorously observed."

During the past year Fitzgerald has operated upon 20 cases, with almost invariable success. Sloughing took place in one case, but the slough was merely superficial. The photographs of the cases which accompany the paper show markedly successful results.

Lund's operation of removing the astragalus has recently been brought forward into renewed prominence by several operators,

especially by Morton, of Philadelphia, who reported 15 cases at the meeting of the American Surgical Association in May, and by Lucas-Championnière. Morton thinks the operation called for, because he holds that the astragalus is so altered in shape and fixed in its abnormal position that it would be impossible to force it between the malleoli, and says that the removal of the astragalus in no wise shortens the limb, because the tibia and fibula in these cases do not articulate with this bone, but with the os calcis. The early age at which Morton and Lucas-Championnière operate—thirteen months and fifteen months, in some cases—would seem premature, as the bones at that time of life are very soft and capable of being molded by properly-directed force steadily applied, and the result ultimately obtained has been, in the experience of the writer, better than after the removal of the astragalus. In inveterate cases the conditions are different.

Verneuil reports a number of cases of equinus following phlegmasia alba dolens, such as had previously been reported by Kirmisson. He thinks that the phlebitis sets up a periphlebitis, which, spreading to the surrounding tissue, sets up a myositis, which, in its turn, produces the contracture, with its consequent deviations and deformities. The extreme pains which accompany phlebitis are to be explained by the intimate relation of the deep veins with the nerves which surround them.

On January 17th, before the Orthopædic Section of the New York Academy of Medicine, Gibney presented a number of cases of talipes calcaneus on which he had performed Willett's operation of excision of a portion of the tendo Achillis, which brought forth the criticism by Judson that the patients on whom the operation had been done had not had restored to them the power of standing on tiptoe, and he thought that the operation was therefore inferior to mechanical treatment. The brace used by Judson is shown in the cuts on the next page, and is described by him as follows:—

"This brace should be made without a joint at the ankle, differing in this respect from the one described in detail by me in 1885. Experience has shown that the joint was useless, and the cause of frequent and expensive repairs. In some cases, also, the knee becomes slightly flexed, evidently because habitual flexion is necessary to enable the tibia to press

against the padded strap at the upper part of the apparatus. It is therefore desirable to attach the upright near the posterior extremity of the foot-piece, and also to incline it backward at an angle (in some cases 10°), which may be determined for each case by repeated trials. The angle may be changed, for experiment, by a heavy blow delivered in an antero-posterior direction while the upright is suitably supported at each end.

"In other respects the brace, shown in its present condition in Fig. 1, is unchanged, and continues in use by a number of patients. It transfers the force of weight and momentum which in the normal foot are received at the ball of

FIG. 1.

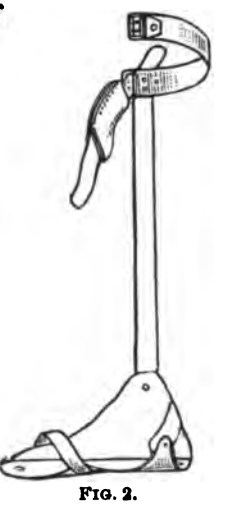


FIG. 2.

JUDSON'S BRACE.
(*New York Medical Journal.*)

the toe, to the upper part of the anterior surface of the leg, near the tubercle of the tibia, where a callus and an adventitious bursa are produced. Adults wear it constantly, as they would an artificial limb, with great increase of their ability to walk well and far."

TORTICOLLIS.

Mayo Collier, June 6, reports a case of spasmodic torticollis of six years' standing successfully treated by ligature of the spinal accessory, after internal medication, galvanism, blistering, removal of the tonsils, and the galvano-cautery applied to the back of the throat had failed. Having found the spinal accessory emerging from the outer border of the sterno-mastoid, he tunneled through the muscle for some distance, taking the nerve as a guide and using a moderate amount of traction on the nerve, but avoid-

ing, as far as possible, injury to the muscle. This done, he applied a loop of silver wire around the nerve as high as he could reach, just twisting the ends to insure slight compression. The wound was treated in the usual way, the ends of the loop protruding. On recovering from the chloroform the spasms had nearly ceased. The wound healed by first intention. The ends of the wire were subsequently cut off close to the skin to allow the latter to grow over them. A year after the operation the spasms had not returned and the sterno-mastoid and trapezius seemed to be uninjured, the patient being able to rotate the head freely.

Bratz[738 Feb.1] describes a new apparatus for torticollis. In the accompanying figure the child has had the sterno-mastoid of the left side cut. The apparatus consists of a band of sail-cloth (1) passing around the chest, in which is fastened a broad plate of tin molded to the chest-wall and properly padded. From this piece of tin two wires (5), bent in the form of an S, pass upward in front and behind the chest and terminate in a padded metal cup (2), fitted to the shape of the child's head, and retained in position by a padded leather band (3), which passes around its neck. A second padded leather band (4) passes from one S-shaped wire to the other across the shoulder opposite the contracted muscle. The part of the wire fastened to the tin chest-plate serves as the long arm of the lever, whose fulcrum is the strap passing over the shoulder, and whose short arm presses against the head when the body-band is in position. When the shoulder-strap is tightened, the short arm of the lever pushes the head into the normal position.

BRATZ'S APPARATUS FOR TORTICOLLIS.
(*Centralblatt für Orthop., Chirurgie, etc.*)

BURNS.

W. Watson Cheyne [645 Jan.4] describes a new way of operating on cicatricial contractions after burns. The patient, a child, had grasped a red-hot poker about a year previously and been severely burned on the palm and flexor surfaces of the right hand. At the time of operation the third, fourth, and fifth fingers were flexed at the first phalangeal joint, and the two terminal phalanges, almost to the tip, were firmly bound down to the palmar surface of the first phalanx, and to the adjacent part of the palm. In the case of the forefinger the deformity was not so great, and consisted merely in contraction of the palmar surface of the phalanges. The method was as follows:—

"On January 25th the forefinger was operated on. A vertical incision was carried down the centre of the scar, from the tip of the phalanx to close to the junction of the finger to the palm, where the incision bifurcated to each side of the phalanx. Over the terminal phalanx the incision also bifurcated in a similar manner. In this way two lateral flaps were formed; when these had been dissected upon each side, it was found that after dividing a few fibrous bands the finger could be brought straight without division of the flexor tendons, which were exposed in the wound. The result was that these flaps, when brought together, covered in the middle phalanx completely and part of the terminal phalanx, leaving the palmar surface of the proximal phalanx entirely destitute of skin. This phalanx was then covered in by a curved flap, dissected up from the palm on the ulnar side of the phalanx. The finger was then put up on a straight anterior splint. On March 6th the little finger was treated in a similar manner. On April 10th the middle finger and on May 5th the ring-finger were freed in the same way. All the wounds healed without suppuration. At the present time, more than a year and a half since the last operation, the movements of the fingers are excellent, as is also the grasping power. (In none of the fingers was it necessary to divide the flexor tendons.) The method of freeing the cicatrix by utilizing it as lateral flaps to cover in the centre of the contraction, the extremities being then covered with flaps from the neighborhood, seems one that is applicable to severe contractions in other situations."

RICKETS.

Robert Füth $_{V.20,p.260}^{366}$ speaks of the value of inhalations of compressed air in rickets. He used, in his experiments, a Waldenburg apparatus, with a self-acting valve arrangement constructed by his brother, J. Füth. $_{B.15,H.3,'89}^{114}$ During the first few days a pressure only 3 millimetres above the normal was made use of, it being increased during the following two or three sittings to 6 or 8 millimetres. The amount of the inhaled air at the beginning was 2 to 3, and later 4 aerometers. Between each aerometer a pause of four to five minutes was made. The sittings were made, when possible, daily. In order to exclude diaphragmatic breathing as much as possible, and to act the more upon the thorax, a firm compress was applied, according to Schreiber's prescription, around the abdomen. Expiration took place into the free air. The action of the inhalations was excellent. The thoracic circumference showed, during the sitting, an increase of 1 to 1½ centimetres. Although dilation was quite unimportant after inhalation, and not entirely constant, yet upon longer treatment, as the comparison of cyrtometric curves showed, deformities of the thorax were very favorably influenced. At the same time the general condition of the children improved, the appetite increased, bronchial catarrhs improved; new catarrhs, pneumonias, and atelectases did not make their appearance during the time of treatment; phosphorus was also given during the same time.

Jolly $_{Dec.8,'89}^{24}$ thinks that phosphoric acid can be substituted for phosphorus in the treatment of rickets with advantage. He uses an "ether of phosphoric acid" (*acide phosphovinique, éther phosphorique acide*) in doses of 5 to 10 drops. He concludes: (1) toxic accidents are to be attributed to phosphorus on account of its marked affinity for oxygen; (2) the success ascribed to it ought to be credited to the phosphoric acid formed by the oxidation of metal. Therefore, in face of the grave dangers that may result from the employment of metallic phosphorus in medicine, we ought to replace it with phosphoric acid, which, free or combined, is free from danger in medicinal doses.

Albert S. Ashmead $_{Oct.11}^{59}$ says that rickets does not exist in Japan. He has never seen a case, and has never met a Japanese physician who had ever heard of one; neither is it mentioned in their books. He thinks the cases of bow-legs that have been described by some

observers as rickets, are merely the normal out-curve of the Japanese leg, due to the peculiar position assumed in sitting. The way of sitting down is quite peculiar. "The Japanese kneels down, turns the tips of the foot inside, and rests the seat on the heels. The inferior extremity of the tibia, the articulation of the tarsus, and the external border of the foot support directly the weight of the body. The knees participate directly in it. The ligaments of the knee, and especially those of the tarsus, are stretched. The head of the astragalus is prominent. The habit of carrying the foot-tip in the adduction position in order to sit down continues even in walking, especially with women, but fashion has something to do with it also. It is the *ne plus ultra* of good form." He thinks the absence of rickets is due to the fact that the children are all breast-fed and are suckled for a very long period, the Japanese women having also an enormously large supply of milk. The diet of the Japanese consists largely of fish and other products of the sea, the crustaceæ and iodized sea-weed. They have also always eaten plentifully of fats and the oils of fishes, blubber of the whale, and loach especially. He asks if this may not take the place of the phosphorized codliver-oil advocated in Europe and America. The universal use of the food under notice, but especially the consumption of fish by the lactating women, together with the fish given to the children after their first year, are, in the opinion of Ashmead, main causes of the non-existence of rickets in Japan. In addition to this, it has been shown by Scheube and Tagachi, a Japanese anatomist, $^{1006}_{78}$ that the length of intestine is greater in Japanese than in Europeans by one-fifth (these statements being based upon 26 observations), and the power of digestion thereby improved.

KNOCK-KNEE.

Julius Wolff $^{69}_{\text{Dec.12,'79}}$ describes his treatment for genu valgum and genu varum. All bony prominences are well padded, and a plaster-of-Paris bandage is applied from the malleoli as far up the thigh as possible, the upper part of the casing being applied very tightly to the skin. The bandage is applied while the patient is narcotized, with the limb in its deformed position. As the plaster begins to set, one assistant fixes the pelvis of the patient, another grasps the region of the inner condyle, whilst the operator himself grasps the middle of the leg at its outside, and, with gradually increasing

force, slightly moves it inward as far as it will go without a violent effort, and holds it fast until the plaster has set. As soon as the patient is nearly free from pain, "which occurs in every instance at the third day, at the least," if any further straightening be required, a wedge-shaped portion is cut out of the cast at the inner side of the knee; the leg is then still further straightened and fresh plaster bandages carried around the knee, so as to fix the limb firmly in its new position. When the deformity has been overcome by repetitions of this process, jointed iron splints are placed on each side of the cast, the joints being precisely opposite the knee-joint and fastened securely by a silicate bandage; the cast is then cut through all around the knee to allow movement. He thinks that all cases, with rare exceptions, under 18 or 20 years of age, are amenable to this treatment in preference to osteotomy.

ANKYLOSIS OF THE KNEE.

Ollier[858 Feb.] contrasts osteotomy and osteoclasis for the relief of ankylosis of the knee, and concludes that osteoclasis is excellent in ankylosis of traumatic or rheumatic origin, and of all descriptions where the primitive trouble has not left behind any morbid germs. In the latter case, a resection is more prudent and more surgical. Besides this, the angle at which the knee is ankylozed has great influence in determining whether osteotomy or osteoclasis should be preferred to resection. The femur and tibia being united at an unchangeable angle, it is impossible to place the tibia in the position to give the limb the greatest length possible without causing, at the same time, above the knee an angle of the same size as the angle of union between the tibia and femur.

He arrives at the conclusion that supra-condyloid osteoclasis is the operation of choice in ankylosis at an obtuse angle; it is very well worth trial in cases at a right angle, but it ought to be abandoned in favor of resection when the leg is flexed at an acute angle. The illustrations on pages 20 and 21 show clearly the soundness of these conclusions.

HIP DISEASE.

Chipault[7 No. 18] reports a case of tuberculosis of the hip-joint occurring in a child 4½ years old, who died of diphtheria a few days after admittance to the hospital. His hip symptoms were only of about five weeks' duration. At the autopsy there was no

visceral tuberculosis. The diseased joint was sound, with the exception of the round ligament, which was inflamed and friable at a point some distance from its attachment to the cotyloid cavity. There was no disease in the bone or cartilage, as was demonstrated on section. The inguinal glands contained a large abundance of giant cells. Histological examination by Darber failed to show bacilli, but he held that the lesion was nevertheless tuberculosis.

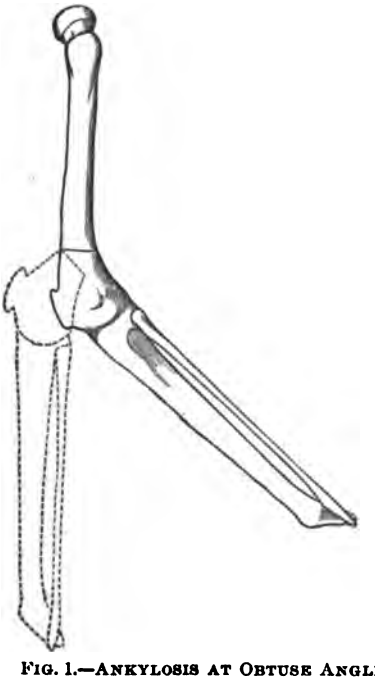


FIG. 1.—ANKYLOSIS AT OBTUSE ANGLE, 135 DEGREES.

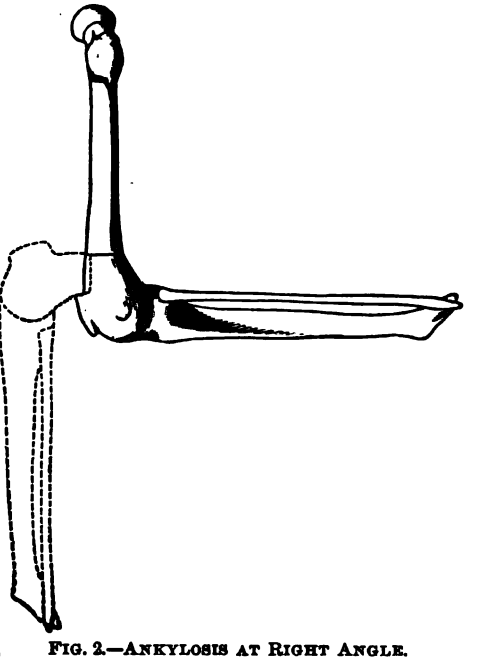


FIG. 2.—ANKYLOSIS AT RIGHT ANGLE.

FIG. 1.—Repetition of the angle of flexion in front of the femur.

FIG. 2.—The replacement of the tibia in the axis of the femur is only possible by the formation of a right angle with the anterior face of the femur. The lower fragment of the femur is thus placed horizontally, and the distance of the tibia in front of the femur is proportionate to the distance from the knee-joint to the point of section.

(*Revue d'Orthopédie.*).

E. G. Brackett[99 Mar.13] revives the question of the possibility of altering by traction the relations of the head of the femur and the acetabulum without opening the hip-joint. The experiments were conducted as follows: Steel pins were driven firmly into the ilium, pubis, trochanter, and shaft of the femur, so that any movement downward or outward could be accurately measured. The traction was made with the leg in extension and abduction, and by means of a graduated spring, in adults with a traction-force of 25 pounds. Lengthening to the extent of from 2 to 8 millimetres

took place, and in only 2 cases was there no separation of the joint surfaces. In 1 of these the joint was found to be the seat of extensive disease, probably rheumatic; the other was stiff from some undetermined cause. In the other cases the joints were examined after the experiments and found normal. The difference in construction of the hip-joints of the adult and child are such that the effects of traction in these cases should receive separate considera-

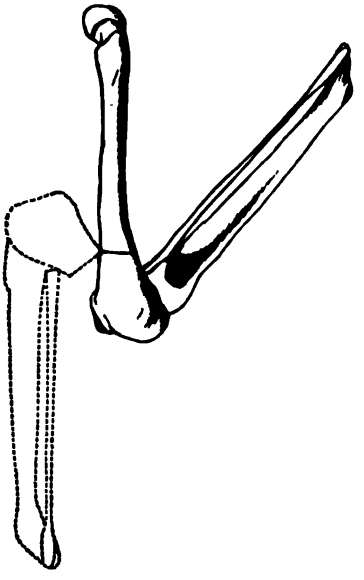


FIG. 3.—ANKYLOSIS AT ACUTE ANGLE STRAIGHTENED BY OSTEOCLASIS.

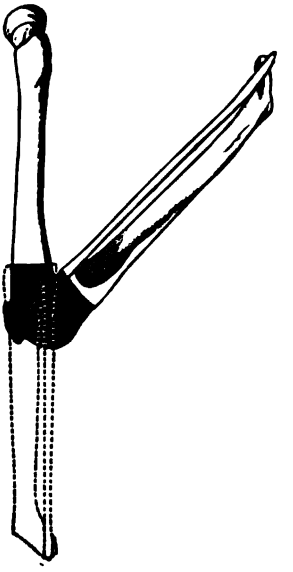


FIG. 4.—ANKYLOSIS AT SAME ANGLE AS IN THE PRECEDING FIGURE.

FIG. 3.—The tibia can only be placed in a straight line with the femur by forming an acute angle in front of the thigh between the upper and lower fragments of the femur. This angle is equal to the angle of flexion of the tibia on the femur. This posterior angle appears in the figure less acute than the anterior angle, but you must only take into account the angle formed by the intersection of the axes of the femur and tibia, and not the apparent angle at the back. The apex of this angle is almost at the anterior portion of the knee, at the level of the inferior extremity of the adherent patella. The knee is more elevated and the limb shortened in proportion as the angle of flexion is more acute.

FIG. 4.—Straightening of the knee by trapezoidal resection, including the entire knee-joint with patella. The limb is a better shape and the same length as in the preceding figure; it is also in better condition for firm union. The awkward projection of the knee has quite disappeared, and, by means of preserving periosteal flaps, a very thick, firm callus is obtained, which hardens much more rapidly than in tubercular lesions on account of the superior adhesive character of the periosteum of ankylosed bones.

(*Revue d'Orthopédie.*)

tion. The difference is both in the cotyloid cavity and in the head of the femur, in the depth of the acetabulum and the axis of the joint. In children the neck of the femur is short, and joined to the shaft at a much smaller angle, forming rather a gentle curve than an angle. The head and articular surface look more directly upward, due in part to this direction of the neck and in part to the fact that it is joined nearer to its upper border; also the plane of the lower portion of the acetabulum, instead of being horizontal, is directed obliquely downward and does not present, for the

lower part of the head, a bearing surface as in the adult; but the bone is held in place by ligaments and muscles, the fibres of which are more nearly parallel to the axis of the joint, and there is nothing in the bony formation of the joint to prevent a separation of the two surfaces nearly in the line of downward traction. Considering these anatomical relations, traction applied in the child should be more effectual to produce a separation. Experiments were made on the cadaver of a 3-year-old girl, in one case with the joint opened, in the second with the joint unopened, with results of separation in different positions, which varied from 1 to 6½ millimetres, the traction-force used varying from 12 to 24 pounds. The opening of the capsule seemed to exert but little difference in the results, the greatest separation occurring in the joint whose capsule was unopened. The arrest of separation in all cases seemed to be due to the resistance of the Y ligament.

Alfred Bidder[226] describes a new operation in primary tuberculosis of the acetabulum, with perforation through the latter into the pelvis. "An incision is made backward and downward from the crest of the ilium to the posterior margin of the great trochanter. The tissues are then divided down to the neck of the femur and margin of the acetabulum, the sciatic notch and region of the joint being laid bare by the incision. The apophysis of the trochanter is then chiseled off at its base in a horizontal direction. After division of the limbus cartilagineus the femoral head is lifted out from its cavity. If the bottom of the acetabulum is found diseased and perforated, the tuberculous matter is removed through the wound in the joint. To render accessible the pelvic side of the acetabulum a semicircular incision is made at the margin of the sciatic notch through the periosteum, and then with a raspatory the periosteum can be separated sufficiently toward the inner side that the finger can be introduced from the pelvic cavity through the perforation into the acetabulum. After removal of the diseased tissues with the curette the femoral head is replaced, the trochanter fixed to the head of the femur with an ivory peg, and a drain passed through the sciatic notch. The advantages claimed for this method are the ease with which the pelvic surface of the acetabulum can be laid bare, the favorable conditions for drainage, and the possibility of replacing the femoral head, if healthy, in its cavity."

CONGENITAL DISLOCATION OF THE KNEE.

Cases of congenital subluxation of the knee are reported by T. Halsted Myers, [1 Apr. 19] V. P. Gibney, [51 Sept.] and L. A. Sayre. [118 Oct.] In all of these cases the dorsum of the foot rested on the abdomen at birth, and there was marked genu valgum as well as hyperextension of the knee. By constant pressure by means of splints changed from time to time, the hyperextension of the joints was reduced until, at the time the cases were reported, flexion to a right angle was possible, and extension went very little beyond a straight line. In all cases the patella was rudimentary, and in one case there was congenital dislocation of both hips.

CONGENITAL DISLOCATION OF THE HIP.

Agostino Pucci [466 V. 7, No. 3] describes treatment for congenital dislocation of the head of the femur. Under narcosis he flexes the thigh strongly, and then brings it down and abducts the limb so as to bring the head of the bone down more nearly to where the acetabulum ought to be, rotates it, and applies gradual progressive extension until, in unilateral cases, the legs are almost the same length. All of this is accomplished in a few minutes. Afterward, for one or two months the parts are immobilized and extension is made with a weight for one month. Later, the patient is allowed to go about with crutches for one month and then with a stick. He has done this operation on 3 cases, 2 with unilateral luxations and 1 bilateral. After the lapse of a year the length of the legs in the first 2 cases was almost normal, whereas at the beginning of treatment there had been shortening to the extent of 5 centimetres and 4½ centimetres, respectively. All 3 children had good function and the hip was retained in its normal situation.

These results do not correspond with those of observers who have reported cures by manipulation and traction, the time necessary to fix the head of the bone securely in its place being fixed by them at two years or more.

William Adams [2 Feb. 22] reports 2 cases of unilateral congenital displacement of the hip, treated by means of recumbency and traction, maintained for two years. At the end of this time they were allowed to go about with crutches and a steel support, passing from the ground to a pelvis-belt fitted with perineal bands and a metal thigh-trough passing under the tuberosity of the ischium,

so as to take the weight of the body off the affected limb; while extension is made by a ratchet in the long rod of the instrument, the foot-plate of which is attached to the foot by straps. A high shoe is worn on the healthy side. A broad webbing belt encircles the pelvis after the manner of Buckminster Brown, a thick pad being put just above the trochanters.

The cases were about 2 years old at the commencement of the treatment. At the time of the report the limbs were of the same length and the motions were normal, but the patients were still using the apparatus for walking and had not tried to bear the whole weight of the body on the affected side; therefore, the results cannot be yet regarded as definite.

L. Rosenfeld, [84] June 17 assistant of A. Hoffa, of Würtzburg, in an elaborate article on congenital dislocation of the hip, reviews all the operations published up to the present time and reports the method practiced by Hoffa.

In autopsies made on newly-born children, the alterations in and around the joint have been found to be slight, the acetabulum always present, slightly narrower, elongated, and without the normal concavity in the posterior part; occasionally the bottom is filled with fat and connective tissue (Paletta and Parisé). The head of the femur is generally without any deformity, at the most but slightly flattened when it joins the ilium; even when it appears atrophied, it is slightly larger than the cavity in the acetabulum (Cruveilhier, Houel, Porto). The capsule and ligamentum teres are almost invariably unchanged, the latter being never absent (Krönlein), only in exceptional cases thinned or lengthened. The only observation on the condition of the muscular system is by Verneuil, [100] who, in the case of a newly-born baby, found the muscles much shortened and less developed on the affected side.

In childhood the alterations are greater in proportion to the amount of walking that has been done; the acetabulum is relatively smaller, more or less triangular in form, the concavity diminished by hypertrophied connective tissue. In many cases exostoses are developed from the bottom of the acetabulum (Porto). The head of the bone gradually moves farther away from the acetabulum. In a preparation of Paletta's three successive impressions were found on the ilium where the head of the femur

had rested at different times. The head itself is generally flattened and appears compressed or flattened. It is often placed directly on the shaft, the neck being either wanting or only slightly developed; the capsule is firm and heavy, and enlarged so as to give more play to the head of the bone. The ligamentum teres is generally present, sometimes flattened and thin, sometimes a thick, solid band. In a few cases it was not present (Bowlby, Morgan, Bennett, Coudray). The muscles around the hip-joint are decidedly shortened; not only those passing from the trochanter major, but those passing in front of the joint (Guérin, Bennett).

The changes in adults are still more marked. In consequence of the weight in walking, as the head of the bone is only held in place by the capsule and ultimately by the ligamentum teres, it is pushed upward as these parts yield. The anatomical appearances differ according as the capsule exists as a thick, closed sac, or, on the other hand, is worn through (Krönlein). In the first case, in which also the ligamentum teres is usually intact, there are often firm adhesions between the capsule and the periosteum of the ilium, but no genuine neärthrosis; we find these, however, in the latter case, as the iliac periosteum throws a bony wall around the head of the femur, which joins with the old capsule as a covering for the head of the bone. This new acetabulum is generally very imperfect, the misshapen head of the femur generally having an equally malformed joint surface on the ilium. The old acetabulum is usually triangular in shape, running backward and upward. In some cases it is entirely obliterated.

According to Porto, exostoses have been found in its place. The muscles are very much altered, either in a condition of abnormal tension or relaxation, and, on account of imperfect use, in a condition of waxy and fatty degeneration (Krönlein, Bardeleben). These observations have all been made on the cadaver, but modern surgery has given us an opportunity of verifying them on the living subject, and in these latter observations the large part played by the shortening of the muscles has been most marked. This shortening was taken into account by the earlier operators. Guérin, in 1841, tenotomized all the muscles attached to the trochanter in 4 cases, 1 a bilateral case. He also scarified the capsule, hoping

to cause inflammation sufficient to retain the head of the bone in its new situation, and subsequently grind a socket for it in the ilium by manipulation. His cases were not successful. Bouvier, in 1855, tenotomized the adductors and ilio-psoas on both sides in a boy 14 years of age, and then applied an extension and abduction apparatus with satisfactory results. Pravaz, the younger, divided the fascia lata in 1869 with good results. Corridge, some time in the sixties, divided the gluteus medius and minimus and applied permanent extension. Broadhurst, in 1865, divided all the muscles that are inserted on and around the trochanter major, and then drew the head of the bone down into the acetabulum, placed the limb in a splint, and applied extension. The result was very satisfactory, the patient walking without a limp, with ⅛-inch cork sole. He has also operated in a similar way in other cases.

As these subcutaneous operations were in many cases unsatisfactory, Hueter, in 1870, suggested removing the head of femur, and then raising periosteal flaps from the femur and attaching them to similar flaps raised from the ilium, hoping thus to obtain bony union between the femur and pelvis. He, however, did not carry this into execution. Koenig, in 1889, followed out this idea. Various operators have resected the head of the femur in order to place the end of the femur in the acetabulum, Röse, Reyher, Heussler, Schüssler, and Lücke being among the first. Margary popularized the method in 1884, and since has been followed by Raffo, Motta, Lampugnani, Battini, De Paoli, Postempski, Vincent, and Mollière. Ogston, in 1885, modified the proceeding by cutting completely through the ilium to cause a deeper acetabulum, in which the head of the bone might rest.

The result of all the resections reported is as follows: In all there are 27 cases of congenital dislocation of the hip reported on which resection of the head of the femur has been performed,—17 unilateral and 7 bilateral, 3 not mentioned clearly. Of the 7 bilateral cases, after operation, 3 walked with a stick, and even then badly; the remaining 4 walked quite well, but also were obliged to use a stick. Of the 17 unilateral cases the result is not recorded in 1 case. Of the remaining 16 cases 1 can walk all day without being tired, 2 can walk one and one-half hours very well, 5 seem, on the whole, to be improved in gait, 2 require a splint,

and 6 either limp or walk worse than before the operation; that is, there are 3 good, 5 ordinary, and 8 bad results.

Hoffa, therefore, would only resort to resection when coxitic symptoms are present in the joint, as is sometimes the case in advanced age. The important part of the operation he has performed consists in the thorough separation from the femur of all the shortened tissues, thereby permitting the head of the bone to be drawn down to the acetabulum. He has operated in 3 cases, all bilateral. He makes a longitudinal incision through the soft parts down to the femur, after Langenbeck's method, subperiosteally separates the muscles from the great trochanter, cuts the fascia lata, rectus, etc., if necessary, and draws down the head of the bone to where the acetabulum should be. If necessary, the acetabulum is scooped out and the head of the bone replaced. The wound is drained, the thigh extended and abducted, and over the dressings a plaster-of-Paris bandage is applied. Two cases thus treated did well; the third died, on the tenth day after the second hip had been operated on, of intercurrent influenza. The autopsy showed the heads of both femora firmly fixed in the acetabula so that it took considerable force to remove them. Hoffa has also recently operated on adults, but has not yet reported his results.

ARTHROPLASTY.

Theodore Glück[4] reported to the Berlin Medical Society, on July 2, 1890, a new method of arthroplasty. He proposes, in cases of joint resections, to substitute an artificial ivory joint, all diseased tissue having been removed. A long, hollow, ivory dowel, perforated with holes, is driven into the medullary canal for a distance of 3 or 4 inches, considerable violence being used to wedge the ivory firmly in place, though care should be taken not to fracture the bone. The projecting ends of the dowels in the femur and tibia, for instance, are each provided with one-half of a hinge and are then fastened together by means of an ivory peg. The wound is then closed without drainage and dressed antiseptically. Glück has performed this operation on the elbow-, wrist-, knee-, and ankle-joints, and exhibited a number of his patients at the International Medical Congress in Berlin last year. The longest time which had elapsed since the operation in any case was ninety days, which was too short to allow definite judgment as to the value of the pro-

ceeding; but those cases which were shown, while they exhibited no bad results from the operation, were in no case sufficiently healed to justify the writer in thinking that Glück's position is yet proven. He has devised various ivory joints to be applied for resection of the ankle, metacarpus, and even of a spinal vertebra, and has had the courage to carry his convictions into practical operation; but whether the result of experience will prove that these large masses of ivory neither act as foreign bodies, nor subsequently become loose from their attachments, remains to be shown.

BUNIONS.

C. H. Hunter[105] Aug. 15 has modified the operation suggested by Fowler last year. Instead of cutting backward between the first and second toes sufficiently to allow the former to be turned backward along the inner side of the foot, he makes a long incision on top of the joint to the inside of and parallel to the tendon of the extensor proprius pollicis, dissecting off the tissues from the inside of the joint with the periosteum elevator until the bony surfaces are well exposed, and then removes a V-shaped piece from the joint with bone-forceps. The piece removed should include more than half of the joint surface. It can be made at an angle, leaving the larger portion on the under side, which gives a broad portion to tread upon.

The wound may be drained through the sole just behind the ball of the foot, if desired, by passing a small rubber tube through a canula thrust through the soft parts. Hunter has operated on three joints thus far with good results.

Donald Macrae[106] July, '99 calls attention to the shoe made by the O'Neil Shoe Company, of Council Bluffs, Iowa, which has a separate compartment for the big toe to be used in the after-treatment of bunions.

AMPUTATIONS, EXCISIONS, AND PLASTIC SURGERY; DISEASES OF BONES AND JOINTS.

By P. S. CONNER, M.D.,
AND
LEONARD FREEMAN, M.D.,
CINCINNATI.

AMPUTATIONS.

In reviewing 400 amputations performed at St. George's Hospital from October, 1874, to June, 1888, Dent and Bull, [2 June 14] emphasize the diminished mortality due to the absence of pyæmia. In a series of 300 cases, between 1852 and 1866, the mortality was 27.6 per cent.; in 200 cases, between 1866 and 1874, 37.5 per cent.; and in 400 cases, between 1874 and 1888, 21 per cent. Amputations after the age of 30 were found to be twice as dangerous, and after 50 four times as dangerous to life as amputations made under those ages. The mortality, according to Essen, [301 v.21, Nos.1,2] attending 162 major amputations made in the Dorpat Clinic, between the years 1878 and 1888, was 17.9 per cent.; for uncomplicated cases, 5.93 per cent. Out of 132 patients discharged as cured, in 76 healing by first intention had taken place. In 205 major amputations made in the Tübingen Clinic, between the years 1882 and 1888, Roman and Klopfer [761 v.6, p.405] report a mortality of but 2 per cent., and for uncomplicated cases of but 0.5 per cent. Primary union was obtained in 81.8 per cent. This low percentage is attributed to the use of "wood-wool" as a dressing and corrosive sublimate as an antiseptic. In 149 amputations made during the reign of carbolic acid the mortality was 9.4 per cent.

Powers, [59 June 7] in an article on conical stumps following amputation in children, submits the following propositions: "1. Amputation through the arm or leg in children may be followed by a conical condition of the stump, and this sequel is a probability rather than an improbability. 2. This conicity may be physiological, and independent of inflammation or retraction in the soft

parts or of osteophytic deposit at the end of the bone. 3. The younger the child, and the nearer the seat of the amputation to the upper epiphysis of the limb, the greater the probability of early conicity. These factors should be considered when making prognosis. 4. The weight of extant authority favors flaps of excessive length, but this measure may not prevent development of the conical condition. 5. When the conical condition is present, the only suitable treatment consists in the resection of a sufficient portion of the bone. 6. Successive re-amputations may be required. 7. The above considerations may apply, but with very much less force, to amputations through the forearm or thigh."

Wyeth[101 May] considers that conical stumps occurring after amputation of the humerus in children are due both to growth at the epiphysis and to deposit on the end of the severed bone.

Rake[2 Mar. 1] has made 2 amputations for leprotic gangrene, in which the patients were almost *in extremis*. The life of one was prolonged nearly six years and that of the other nearly two years.

McHatton[117 July] reports on 170 consecutive cases of railroad surgery, and Porter[756 Jan.] contributes an article on primary amputation.

Moore[105 Mar. 15] made an amputation at the shoulder for sarcoma in a child of 1 year; while White[2 Jan. 25] amputated the arm of an infirm lady of 80, and O'Callaghan the arm of a man of 74 with senile gangrene, recovery resulting in each case. Hutchinson[6 Mar. 1] reports recovery from an amputation of the arm for senile gangrene in a man of 65. O'Callaghan says: "I regret the fact that I have allowed cases of senile gangrene to die a miserable death without giving them the chance of recovery by amputation." A successful operation through the upper third of the humerus for spreading gangrene is also reported by Caird.[36 Nov.]

Biddle,[787 Jan.] in reporting 3 successful double amputations of the leg, calls attention to the fact that 2 of the patients came out of severe shock during the inhalation of ether. O'Callaghan[6 Mar. 1] claims that "the administration of ether lessens or lulls the primary shock, and, when the crushed and mangled parts are removed, the secondary shock is not so great and is easier to rally from." O'Callaghan successfully amputated both legs below the knee in a patient with mitral regurgitation. Wyeth[1 May 10] drains the medullary canals of long bones, after amputations for osteomyelitis, by means of rubber tubes inserted within them. Hutchinson[138 Oct.] describes an

interesting case of nervous disease of a stump after amputation of the arm, in which the patient was affected with severe and continuous pain. Resection of the nerves gave no relief, as sclerosis extended into the plexus beyond reach.

Successful amputation of the leg of a man aged 73 is reported by Worthington.[22 Nov. 5]

SPECIAL AMPUTATIONS.

Lewis[26 Feb.] finds that the mortality attending interscapulo-thoracic amputations, when made for disease, is about 20 per cent.; but, when performed for recent injury, the mortality is 30 per cent. or more. He reports a successful amputation for osteosarcoma of the shoulder-joint. Von Eiselsberg[12 Aug.] has made 2 operations, followed by recovery, and Chevasse[2 Jan. 18] a successful operation for osteochondroma. Chevasse insists on the removal of the middle third of the clavicle as a first step in the operation, in order to secure the vein and artery at once and prevent entrance of air into the former. Heath and Barwell dispute the necessity of this. Heath amputates at the shoulder, secures the vessels, and then removes the scapula.

Hip-Joint.—Morton[9 Feb. 28] gives to W. J. Duffy the credit of making the first amputation at the hip-joint for osteomyelitis of the femur. The operation was performed at the Philadelphia Hospital about 1840.

Garden[2 Jan. 4] reports 14 amputations without a death from the operation itself. He cuts his flaps according to Furneaux Jordan, securing the vessels by the skewer method suggested by Spence. Jackson[2 Mar. 28] operated successfully for sarcoma of the femur and Wyeth[101 Aug.] for osteosarcoma of the thigh. Wyeth[1 May 10] explains a skewer method of controlling hæmorrhage in amputations at the hip-joint. Maclaren[2 Jan. 4] speaks strongly in favor of the low operation, which he claims was introduced by Furneaux Jordan, and not by Myles. Maclaren ties all the arteries easily found, and then sutures the lower edges of the flap, but not the edges of the longitudinal incision. He controls hæmorrhage from small vessels by stuffing this longitudinal incision with sponges wrapped in gauze, thus avoiding the shock incidental to too lengthy manipulation. His mortality, when the operation is for disease, is 1 in 6. Küster and von Bergmann make first a high, circular amputation, with longitudinal incision into the joint over the great trochanter. Von

Bergmann attributes this operation to Beck, and has made 12, with but 1 death. Bardeleben amputates similarly to Rose and Baring, the operation requiring about an hour.

Knee.—Ssabanejew[654 Jan.] describes a new method of amputating at the knee presenting all the advantages of the Gritti operation. A long anterior flap, reaching two finger-breadths below the tuberosity of the tibia, is cut out, but not separated from the bone. A short posterior flap is made, the ligaments severed, and the joint opened from behind. The leg is then turned up onto the superior surface of the thigh and the anterior face of the epiphysis of the tibia sawn off, corresponding to the flap previously marked out.

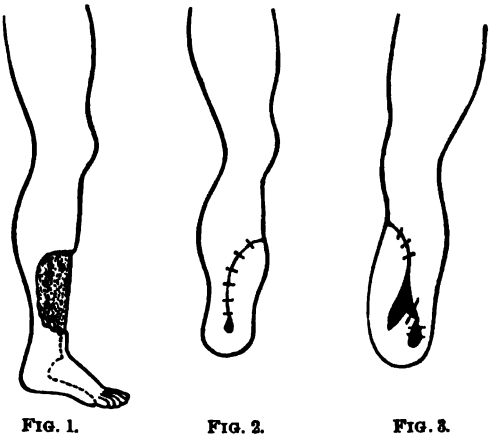


FIG. 1. FIG. 2. FIG. 3.

KEETLEY'S AMPUTATION FOR ULCER.
(*Lancet.*)

The condyles are then sawn through and the bone-flap brought into place against the end of the femur.

Oliva[13 June] has collected 40 amputations of the thigh according to Gritti, with 33 good results, the operations being reported within the preceding year. He states the advantages of the procedure and its indications.

Foot.—Keetley[6 Feb. 1] calls attention to his method of amputation of the foot in cases of incurable crural ulcer. A large flap is cut from the sole of the foot, the leg is amputated at a suitable distance above the malleoli, and the flap brought into place upon the surface of the thoroughly-scraped ulcer (see Figs. 1, 2, and 3). Baracz[113 Sept. 22, '89] failed in obtaining a good result in this operation on account of atheroma of the arteries; but Schinzinger, Bogdanik,[113 Oct. 19, '89] and Rydygier have operated with excellent success, Rydygier pre-

serving the extremity of the os calcis as in Pirogoff's amputation. Keetley also twists a flap from the dorsum of the foot around the tibia above the internal malleolus, so as to cover an ulcerated surface on the posterior aspect of the leg (see Figs. 4 and 5). An encircling ulcer of the leg may thus, under suitable circumstances, be entirely covered by flaps from the foot.

Ollier[211 May 25] suggests a method for amputation of the foot which he claims is superior to that of Syme or Roux, and may be applied even when the tibia must be divided 10 or more centimetres above its lower extremity. He preserves the soft parts of the heel and the periosteum covering the os calcis. This flap is brought against the sawed end of the tibia, and the tendo Achilles is sutured

FIG. 4.

FIG. 5.

AMPUTATION OF THE FOOT FOR ULCER.
(*Wiener Med. Presse.*)

to the anterior tendons of the leg. Köhler[4 May 26] modifies Pirogoff's amputation by sawing horizontally through the calcaneus and bringing the fragment up against the raw tibial surface. Kranzfeld[336 May 17] makes a similar operation, except that he unites the horizontally-divided calcaneus with the sawed surface of the astragalus instead of the tibia, thus getting a movable stump with broad supporting surface and very little shortening. A new osteoplastic amputation of the ankle-joint is described by Wilson.[227 Oct.]

RESECTIONS.

Schmid-Monnard[336 Dec. 28, '89] emphasizes the necessity of having a standard of time by which we can judge whether a resection is

successful or not in removing tubercular disease. He regards all resected joints remaining healed two and one-quarter years as probably definitely healed, and thinks that results should not be tabulated before this time. He bases his conclusion on 116 deaths, 80 per cent. of which occurred within the first two years and nearly all the remainder within five and one-half years. After two and one-quarter years, only 4 per cent. of all cases die from the tuberculosis or its immediate consequences. König's assumption that the percentage of yearly deaths would continue the same from the fourth to the fourteenth year is a fallacy.

Boeckel [168 Mar.1] publishes, with extensive tables, the statistics of 53 amputations and 151 resections, made between 1875 and 1888, for local tuberculosis. The amputations furnished 49 recoveries and 4 deaths. In 127 articular resections, 97 lasting recoveries from disease and 30 deaths resulted, of which 15.7 per cent. was from tuberculosis. From 24 osseous resections resulted 15 permanent recoveries and 9 late deaths, of which 29.1 per cent. was due to tuberculosis. Amputation was found to have a lower mortality than resection when including the hip-joint; but if that joint be excluded, resection is found to be only half as dangerous as amputation, and should always, where possible, be employed.

Ollier [55 Mar.1] holds that suppurative arthritis cannot be successfully treated by arthrectomy; resection is necessary. He thinks the operation of resection has recently been too much employed in military surgery, and gives the indications and contra-indications for its use.

Tryde [41 Apr.2] reports favorably on Bramann's method of dressing arthrectomies and resections of joints, basing his opinion upon 19 cases. The wound is left open and stuffed with iodoform gauze, which is not removed for from three to five days. The incision is then secondarily sutured without drainage.

Willard, [112 Apr.] in a thorough article on erasion in diseases of the joints, speaks very highly of the operation, especially in pulpy degeneration of the knee and in caseation without suppuration, particularly when these occur in children. Repeated tenotomies and erasions may sometimes delay excision for years, and thus secure the growth of the limb. Ankylosis is usually to be expected. The operation produces less shock than excision, and much time is gained if extirpation of the disease is complete.

SPECIAL RESECTIONS.

Sternum.—Dudon [188 June 1] says that when the sternum is resected for fracture, caries, necrosis, or any chronic inflammation, the periosteum should be preserved, not only because it may reproduce bone, but also as a protection to the mediastinum. If the sternum be resected for a tumor, the periosteum should be removed. He concludes that (1) primary tumors of the sternum are rare, sarcomata and chondromata being the most frequent; (2) resection of the sternum in such cases should be practiced; (3) the operation should be made early. Sarcomata are more frequent than chondromata in the proportion of 5 to 3, the latter developing earlier in life than the former. The origin is often traumatic. The prognosis is serious, especially for sarcomata. Resection of the sternum need have no bad effect upon the thoracic organs. The histories of 9 resections are given, one by Dudon himself, with 5 recoveries and 4 deaths. Mering [9 Mar. 8] also reports a resection of the sternum for caries, with recovery.

Scapula.—Southam, [2 Dec. 14, '89] Perier, [3 Feb. 13] and Maclean [9 Sept. 13] report successful removals of the scapula for sarcomata. In Southam's case there was a relapse followed by death.

Knee.—In 101 resections of the knee-joint, made in Lücke's clinic and tabulated by Neugebauer, [301 B.20, H.4] there occurred 60 per cent. of cures, 18 per cent. of incomplete cures, and 13 per cent. of secondary amputations,—a good result in 85 per cent. of cases. The least amount of ultimate shortening in partial excision was found between the ages of 1 and 10. Lucas-Championnière [3 Aug. 6] reports 44 resections of the knee without a death, all for tuberculosis with the exception of 1. In all but 4 the disease was at once checked and useful limbs obtained. For two months after the operation his patients are not permitted to put a foot to the ground. He uses no ligatures, but dresses the wound before removing the Esmarch bandage, and leaves the dressing in place twenty-five days.

Forty-eight resections of the knee-joint in children under 14 years, with 70 per cent. of total recoveries, are reported by Angerer. [84 June 21] He thinks the danger of overlooking foci of disease is not so great as is generally supposed.

Schlüter [301 V.20, p.265] gives the results of 100 resections of the knee-joint, made on individuals over 20 years of age, in the Göt-

tingen Clinic. The oldest patient was 66, the remainder ranging from 20 to 60. In 64 per cent. a useful leg was obtained within six months. He recommends the operation rather than amputation in all cases where the disease is not too extensive.

An interesting contribution is also made by Schlüter $\frac{301}{\text{v.30,p.265}}$ regarding resection of the knee-joint for tuberculosis in adults. His conclusions are based on 287 operations from all sources, comprising the 100 already mentioned on individuals over 20 years of age in the Göttingen Clinic. Cure resulted in 63.8 per cent., 12.9 per cent. were not cured, 10.8 per cent. required subsequent amputation, and 12.5 per cent. died. The best results were obtained in individuals between 30 and 40, who comprised 55 per cent. of all the cases. In the succeeding decades the results became progressively worse, but with never less than 50 per cent. of cures. The ages of the patients ranged from 20 to 66 years. In 274 resections, made on patients below 20 years of age, 63.8 per cent. of cures were obtained, 15.7 per cent. not cured, 9.6 per cent. required subsequent amputation, and 10.9 per cent. died. It is seen from these figures that the results of resection of the knee-joint in the young and in the old are almost identical. Kramer reports in this connection a successful resection of the knee-joint in a woman aged 70.

Fifty consecutive cases of resection of the knee-joint, without a death, have been made by Thompson. $\frac{16}{\text{Dec.,'89}}$ He maintains that resection is safer and more satisfactory than erasion, and Stoker holds a similar view.

Bothe $\frac{13}{\text{June}}$ reviews the resections of the knee-joint made in Bruns's clinic, 129 being for tuberculosis and 11 for ankylosis in a bad position. Most of the cases were males under the age of 20. The osseous form of tuberculosis comprised by far the greatest number of cases. The mortality was zero. Out of 83 cases operated upon more than a year previously, 72 had suffered no relapse. In 5 cases subsequent amputation became necessary. Bony union of tibia and femur was obtained in 105 operations out of 107, the average time required for such union seeming to be about one year. Disturbances in the growth of the limb almost always follow resections. In 47 cases the limb subsequently shortened, and the shortening increased with the extent of the resection. In but 4 cases was lengthening present. In all but 8 cases the shortening

could be compensated for by sinking of the pelvis and pointing of the toe. The writer concludes that where arthrectomy is not sufficient, resection is in place and gives good results.

There has been much discussion during the year as to the comparative merits of erasion, or arthrectomy, and resection, especially as regards the knee-joint. The weight of opinion, both in America and abroad, seems to lie with resection, especially in adults, unless the disease be very limited indeed. The idea of obtaining a movable joint after erasion has been almost universally abandoned.

Cervera y Ruiz, [25 Dec., '99] of Madrid, in making erasions of the knee-joint, inserts a small drill into the epiphyses of the bones; thus determining, by differences in resistance, the probable presence of tubercular foci and the necessity of resection. He reports 4 successful arthrectomies. He spares the ligaments, if possible. The overlooking of tubercular foci may be avoided, according to Sendler, [336 Feb. 22] by searching for tender points over the ends of the bones before anæsthetizing the patient, and also after opening the joint; the cartilage over such areas is found to be softened.

An improved method of operating in angular ankylosis of the knee is offered by Helferich, [84 July 12] in which the danger of producing shortening of the limb or of destroying the epiphyseal cartilage, as in the old, wedge-shaped resection, is avoided. König, however, calls attention to the fact that most of these cases are of tubercular origin, and a wedge-shaped resection is desirable in order to remove tubercular foci.

Wyeth [101 Apr.] reports a successful resection of the knee-joint for an old, traumatic, backward dislocation of the tibia. A resection of the knee-joint, with good result, in a patient aged 63, was made by Lebeau. [663 May 29] After resection of the knee, Lebeau makes suitable cavities in the anterior surfaces of the ends of the tibia and femur, into which he sutures the patella, thus adding to the firmness of union of the bones.

König [84 June 21] calls attention to the fact that too early attempts at motion after arthrectomy are apt to bring on a speedy recurrence of the disease, in case all the tubercular foci have not been removed. König prefers, in general, resection to arthrectomy. In discussing Gibney's paper on operative procedures in the bone diseases of childhood, Stimson and Wyeth [1 Sept. 20] spoke in favor of resection of

the knee as against arthrectomy, especially in adults; while Gerster thought that in children, at least, arthrectomy should be tried before resection. Kammerer favored conservatism or resection, as the case might indicate.

Clavicle.—Resection of the entire clavicle has been made by Murray[1 May 10] and by Barling.[2 Mar. 15] Gangolphe[211 Sept. 28] resected the outer two-thirds of the clavicle for tuberculosis, with a good functional result; while from the Mt. Sinai Hospital comes the report[1 Mar. 8] of a removal of the entire clavicle, with complete reproduction of the bone and restoration of function. Sutton[2 Oct. 18] successfully removed the acromial half of the right clavicle for myeloid tumor.

Hip-Joint.—Baehr[301 v. 20, p. 349] reports on 86 resections of the hip-joint made in the Strasburg Clinic, Langenbeck's incision being used in 80 cases. Healing by first intention was not once obtained. The mortality was 43 per cent., directly proportional to the extent of disease of the pelvis, as was also the number of cures; 35 per cent. recovered from the disease (wound remained healed for at least one year). During the first months following resection the average shortening was 2½ centimetres, which, however, in time became twice or three times as great from shrinkage of the soft parts, luxation of the upper extremity of the femur, and arrest of growth, the last named increasing with the age of the patient. Those able to walk in various ways after the operation numbered 44. As regards motion, a flail-joint was obtained in 2.1 per cent., ankylosis in 23.9 per cent., limited motion in 50 per cent., and free motion in 17.3 per cent. Contrary to Volkmann's observation, free movement was not obtained once in a series of 4 subcutaneous resections. The freest motion occurred after simple decapitation. Ankylosis should not be considered a misfortune if the leg remain in a good position. An "ischiadic method" for arthrectomy or resection of the hip-joint is described by Bidder,[226 B. 29, H. 4] which is especially adapted to cases of primary tuberculosis of the acetabulum with perforation into the pelvic cavity. The incision for the operation begins at the crest of the ilium and ends at the posterior border of the great trochanter, exposing, in its course, the hip-joint and the great sciatic notch.

Patella.—Kummer[197 Nov. 20, '99] reports a successful resection of the patella for tuberculosis, and quotes 7 other cases of this rare affection. He concludes: (1) resection of the patella, when affected

with tuberculosis, should be made as early as possible, in order to save the joint; (2) resection offers better chances of recovery than scraping; (3) resection is indicated in tubercular disease limited to the patella; (4) resection may be made without interfering with the patient's gait or with the movements of the knee.

Elbow.—Pengniez [230 Nov., '99] resected the elbow successfully for ankylosis of fourteen years' standing and obtained good movement. In order to get a good result in resection of the elbow-joint for ankylosis, Duzea [91 Nov. 10, '99] mentions the following points: (1) the resection must be subperiosteal; (2) at least 4 or 5 centimetres must be removed from the humerus and bones of the forearm; (3) a circular zone of periosteum must be cut out on a level with the future line of articulation; (4) passive motion must begin about the third day, and active motion as soon as possible; (5) daily exercise of the muscles with electricity must be resorted to as soon as cicatrization is complete.

Carpus.—Martin [9 Dec. 14, '99] speaks in favor of complete resection of the wrist in suitable cases. He reports 2 operations, in 1 of which a thoroughly useful hand was obtained. Gritti [8 July 8] proposes a new method for total resection of the carpus, in which he makes two longitudinal incisions, and a transverse incision which divides all the extensor tendons except the extensor hallucis proprius, thus forming two flaps. The tendons may subsequently be reunited. A successful resection of the carpus for tuberculosis is reported by Bernays, [514 Apr.] of St. Louis.

Foot.—Scudder [99 Jan. 20] tabulates 18 cases of chronic disease of the ankle and tarsus treated in the Children's Hospital of Boston. He is in favor of excision.

Obalinski [336 Oct. 25] presents a new method of incision for facilitating the examination or resection of the smaller bones of the tarsus, with but slight injury to the tendons or nerves. Beginning between the third and fourth toes, he splits the foot vertically through its whole thickness directly backward to the astragalus and os calcis, passing between the cuboid and the third cuneiform and scaphoid. The medio-tarsal joint is then opened and the two halves of the foot dragged wide apart. After removing tubercular foci, the wound is stuffed with iodoform gauze and sutured.

Ollier [211 Dec. 29, '99; 100 July 26] strongly recommends his operation of resection of the astragalus in suitable cases of tuberculosis, and compares

the operation to an arthrectomy. He claims to avoid, by this means, relapse of the disease, and also the necessity for amputation, except in desperate cases. Besides the fact that the astragalus itself is often diseased, its removal permits a thorough inspection of the area to be operated upon. The foot remains somewhat reduced in size, but neither its form nor its functions are altered. Bataille[208 May 16] quotes Ollier as reporting 36 operations, mostly in young individuals between 11 and 20 years of age. In 4 of these the results are unknown. In the remaining 32 cases, 23 proved successful and 9 were failures, 7 of which died either from suppuration or from pulmonary phthisis. In 1 case amputation was subsequently made. The mortality was about 20 per cent.

Paulsen, of Copenhagen,[16 Feb.] successfully replaced an astragalus which had been removed during an operation for arthritis of the ankle and placed in a 0.6-per-cent. lukewarm chloride-of-sodium solution. Von Mosetig[4 Jan. 13] similarly replaced the olecranon after its temporary removal to facilitate the scraping of a carious joint. A new osteoplastic method for arthrectomy of the ankle-joint is given by Girard.[301 v.20, p.164] He cites 5 cases in children in which the results were very satisfactory in all but one, where recurrence took place. The form and function of the foot remained undisturbed. He makes a longitudinal incision across the external malleolus, which he separates from the fibula. The foot, after loosening the capsule of the joint, may then be luxated inward so as to amply expose the articulating surfaces, even in small children. The malleolus is replaced and the severed tendons sutured. Thierbach[8 Jan. 28] makes a plea for Hueter's method of resecting the ankle-joint, which seems to stand in disfavor with many surgeons. He also reviews the various methods of operating.

Gabritschewski[569 Nos. 94, 97, 98] gives the following indications for the Vladimirow-Mikulicz osteoplastic operation: (1) tuberculosis confined to the astragalus, calcaneus, and ankle-joint; (2) ulcers of the calcaneous region; (3) wounds, especially gunshot; (4) badly-united fractures of the ankle; (5) malignant growths of the heel; (6) shortening of the leg due to resection of the knee-joint. It is possible to lengthen such a leg fully 8 centimetres. In a review of Mikulicz's operation, Lammert[34 Mar. 11] emphasizes the advantage gained by the extensive view afforded of the parts diseased. Out of 26 operations for caries, 5 subsequent amputations became

necessary; 18 were cured, of which 11 could walk without artificial support; and 2 died of tuberculosis (Butz). As much as 14 centimetres of bone have been removed with good result (Gutsch). In all cases catgut bone-sutures should be employed. Suture of the puckered anterior soft parts and tenotomy of the flexor tendons of the toes are unnecessary, but the posterior tibial nerve should be reunited (Roser). Lammert reports 5 cases.

Erwin [59] removed subperiosteally, for "dry ostitis," all the bones of the foot and ankle except the metatarsal of the great toe and the phalanges of all the toes, and dressed the wound by saturating it with balsam of Peru, diluted with glycerin. In about ten months the bones were completely regenerated, and the boy obtained, at the end of eighteen months, as sound and useful a foot as ever.

Rheumatism.—Arthrectomy is recommended by Dubujadoux [243] in certain grave forms of acute articular rheumatism ("osseous, deforming rheumatism"). Pain is at once relieved and the fever subsides.

First Rib.—A new method for resection of the first rib is given by Ceci. [8] His incision extends from the middle of the posterior border of the sterno-cleido-mastoid to the second intercostal space in the mammary line. The clavicle is sawn through and turned inward out of the way. At the close of the operation the divided clavicle is reunited with wire sutures.

Fibula.—Plittner [69] reports an ununited fracture of the tibia in which union was prevented by the fibula, also broken, which by uniting first had acted as a splint, holding the fragments of the tibia apart. After the failure of other methods, union was finally obtained by resecting a portion of the fibula, freshening the ends of the fragments of the tibia and wiring them together. The writer also suggests that the union of a badly-fractured tibia may be hindered by an unfractured fibula, or a fibula dislocated from the tibial head. It might be well, in such a case, to resect a portion of the fibula at once, and thus avoid the danger of pseudarthrosis.

Symphysis Pubis.—The left half of the symphysis pubis has been successfully removed for tubercular disease by Moty. [100] He concludes: (1) it is possible to remove part or a whole of the symphysis pubis without injury to the urethra; (2) the spermatic

cord may be pushed up or down to allow sufficient room for the incision; (3) a counter-opening in the perineum is important on the score of drainage; (4) a definite cure is to be accepted with reserve, but the operation may be of much immediate benefit.

Ilium.—The ilium has been twice successfully trephined by Terillon [61 Jan. 11] to secure drainage for pelvic abscesses.

Osteotomy.—A successful subtrochanteric osteotomy of the femur was made by Vincent [211 Apr. 27] for ankylosis at a right angle, in which the lower fragment of the bone was sutured into a hole mortised from the posterior surface of the great trochanter.

Jones [101 Jan.] reports a removal of the entire shaft of the femur, with re-formation of the bone and but ½ inch shortening.

DISEASES OF BONE.

Tuberculosis.—Krause, [4 July 14] Marsh, [6 July 28] and Croft have written extensively on the treatment of tubercular diseases of joints. Croft [6 Feb. 8] places himself on record, in opposition to Marsh, as in favor of excision in contradistinction to non-operative forms of treatment, in spite of the fact that the rate of mortality up to the present time is slightly in favor of the anti-excisionists. He thinks erasionists are too apt to overlook tubercular foci so often found near the epiphyseal lines.

The development and manner of distribution of tuberculosis of the joints has been studied by Pawlowsky. [50 Feb. 7] The connective-tissue corpuscles are the first to become infected by the tubercle bacilli. A moderate number of bacilli causes multiplication of these corpuscles and their transformation into epithelioid cells, while a large number of bacilli causes death of the corpuscles by growing within them. As regards the white corpuscles, they are either (1) destroyed or (2) changed into epithelioid cells, and assist in building up the tubercle, or (3) they carry bacilli to remote regions of the body, especially the neighboring glands, thus causing secondary infection. In tuberculosis of the knee, artificially produced in animals, bacilli were found in the inguinal glands in six days, in the pelvic glands in eight days, and in the retroperitoneal glands in ten days. The writer thinks that general infection seldom occurs through the blood-vessels, but nearly always through the lymphatics, requiring in guinea-pigs several weeks. The greater the number of glands which the bacilli are

required to pass through, the longer is general infection delayed. Similar facts have been observed in man. Infection of the inguinal glands follows tuberculosis of the knee, and infection of the cubital gland follows tuberculosis of the hand. Hence, connective-tissue corpuscles play only a local rôle in tuberculosis (contrary to Virchow); while white corpuscles not only assist in building up tubercle, but also accomplish general infection.

Schramm [84 May 9] has treated 232 cases of tuberculosis of various joints. In coxitis he reports 55 per cent. of recoveries by extension and expectant treatment. He speaks in favor of arthrectomy. Conservative measures are also recommended by Cauchois [208 Mar. 15] in tubercular osteitis of the extremities. Ollier and others have shown the advisability of conservative treatment in tuberculosis of the anterior portion of the foot in young subjects; while Cauchois endeavors to show that the same course is justifiable in adults, where the disease is mainly confined to the bones.

Parmenter [170 Apr.] thoroughly reviews the general and local methods of treatment used in tumor albus. Roswell Park thinks secondary dissemination from tumor albus not so common in America as abroad, and reasons that this is due to the better condition of our working-classes. The symptomatology and diagnosis of tumor albus is discussed at length by Smith. [170 Apr.] He insists that operative treatment should begin as an exploratory incision and progress according to the pathological changes found.

Bauer [514 June] writes on the origin of the disintegration of bones and joints. He seems to adhere to the opinion that the bacillus tuberculosis is a mere scavenger, and not the cause of the disease.

It is believed by Rabl [84 Apr. 5] that a great number of severe tubercular lesions of large joints can be cured by simple, conservative, hygienic treatment. The mortality is not greater and the functional results not worse than by operative methods. He reports 8 cases. The speedy extirpation of tubercular foci is not necessary, according to Ollier and Bruce Clarke, [645 Dec. 14, '99] in order to prevent generalization. Cheyne [6 Nov. 15] discusses expectant treatment *versus* operative interference.

Lucas-Championnière [212 Nov. 25] writes exhaustively on the treatment of tuberculosis of joints, including statistics of operations. Articles have also appeared by Plum, [336 No. 5] Regnier, [184 Feb. 15] and Mollière. The last named divides "white swelling" into (1) ulcerating arthritis, which

is not tubercular and is characterized by destruction of the cartilages, and (2) the fungous or tubercular form.

Succin [113 Aug.2] writes on the subperiosteal resection of the elbow-joint in tubercular osteo-arthritis, and advises its use whenever practicable, as it offers a possibility of restoration of the joint. Chamarro [836 No.22] describes a rare condition which he calls "acute tubercular hydrarthrosis," consisting in a local eruption of tubercles over the serous membrane of a joint, with effusion, in a tubercular subject.

Von Bergmann, [404 No.1] Bryce, [213 May] and Bidder [69 July 2] have written on occipito-atloid disease. Von Bergmann emphasizes its claims as a distinct disease, while Bidder distinguishes it from sarcoma of the base of the skull by the fact that extension relieves pain in the tubercular trouble and increases it in sarcoma.

Zadeck [41 Nov.6] reports a case in which a bony tumor projected into the pharynx, caused by tubercular thickening of the bodies of the cervical vertebræ. Henoch calls attention to the fact that small bony protuberances are often present on the posterior pharyngeal walls of young children, but disappear after a time without symptoms. A case of tuberculosis of the inferior maxillary bone, with spontaneous fracture, is described by Cnopf. [34 Nov.18]

Lannelongue [91 Nov.,'99] discusses permanent deformities of the fingers following tuberculosis. Cale [514 Feb.] reports a successful operation for tuberculosis of the sacro-iliac joint, and Ceccherelli [569 p.176] describes 5 cases of vertebral caries treated by scraping, 3 being cured and 2 improved.

Foot.—Interesting articles have appeared by Ollier, [91 Nov.,'99] Cerné, [208 June 15] Forgue, [100 Nov.19,'99] Larsen, [336 June 28] Audry, [1008; 152 Sept.26] Stillman, [779 June] Ransohoff, [9 Nov.29] Parker, [779 June] and numerous others. According to Ollier, amputation is indicated when pulmonary complications are present or when the patient is over 40 years of age. Cerné thinks all conservative methods should first be tried before resorting to amputation, and Forgue expresses the opinion that many cases of tuberculosis of the foot may be cured by simple conservative operations (ignipuncture, etc.), together with time, hygiene, and general medication; the chances of recovery, however, vary inversely with the age. He strongly recommends preliminary removal of the astragalus, which Cerné has found to have been the original seat of tuberculosis in 52 cases. This implication of the astragalus is

confirmed by Kocher, Vogt, and Holmes. Roberts has seen 12 recoveries in 15 removals of the astragalus, while Dumond has made 4 operations with excellent results. Ollier, the originator of the operation, has removed the astragalus thirty-two times within the last four years without a death.

Ankle.—Larsen gives the results of 51 operations for tuberculosis of the ankle-joint, together with a number of conclusions derived from an extensive study of the literature of the subject. Audry cites 16 cases in support of the view that tuberculosis of the foot may begin in the soft structures of the joints before appearing in the bones. In 104 cases of osseous origin the starting-point was the os calcis in 37, the astragalus in 18, the metatarsus in 26, the tibia in 10, and the fibula in 4. In 14 the origin was doubtful. He reports 17 recoveries in 40 resections, and 11 recoveries in 24 igneous arthrectomies. He strongly recommends removal of the astragalus. Ransohoff reports 15 *évidements* with but 2 cures, and these were in children; while in 6 cases exacerbation of the disease resulted. He also reports 12 excisions, mostly following the above *évidements*, with but 4 failures.

Garré [41 Apr.24] divides primary tuberculosis of tendons into *tendovaginitis fungosa* and *hygroma proliferans.* Eighty per cent. of cases is localized in the hand. Ganglion of the sheaths of tendons is not tubercular. The hygroma may be treated with incision and drainage, extirpation, or injections of iodoform emulsion; but the fungous or tubercular form must always be thoroughly extirpated.

Articles on the use of iodoform injections in tuberculosis of joints have appeared by Krause, [4 July 14] Bruns, [41 Apr.14] Garré, [214 No.6] Mesnard, [188 Apr.18] and Dollinger. [113 Apr.6] Krause uses a 10-per-cent. iodoform mixture, consisting of iodoform. 50, mucil. gum. arab. 23, glycerin. 83, aq. dest. q. s. ad 500. He injects 20 to 40 grammes (5 drachms to 1 ounce 2 drachms) of this mixture, enough to lightly fill the cavity, and does not subsequently fix the joint, considering slight movements as beneficial. The operation should be repeated about every four weeks until cure results. Out of 78 advanced cases of tubercular trouble, 23 were perfectly cured and improvement resulted in nearly all the remainder. The knee offered the best results. Bruns uses a 10-per-cent. mixture of iodoform in olive-oil or glycerin, and before injecting the iodoform he empties the joint of pus and washes it out with boric-acid solution. Fifty cases

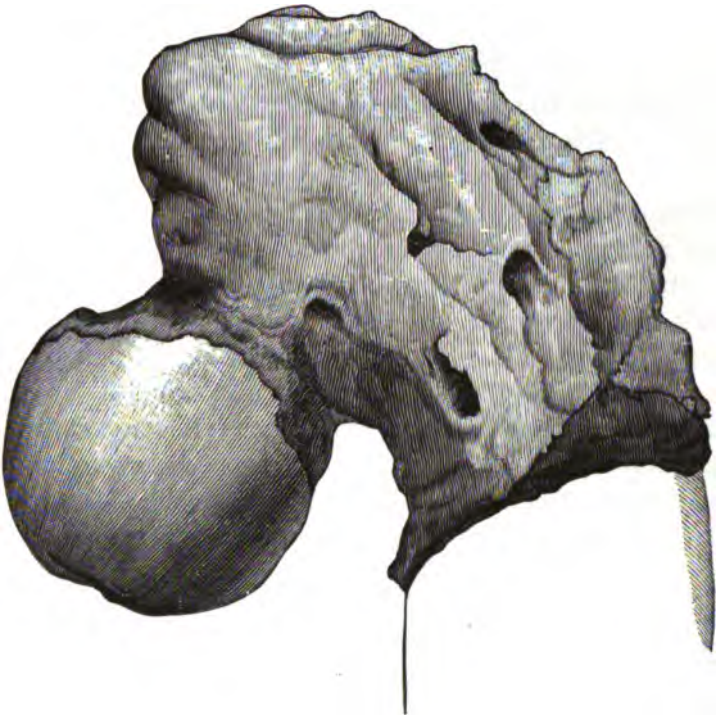
were treated and all underwent improvement. Trendelenburg reports 68 per cent. recoveries in 135 cases, while Eiselsberg and von Bergmann have also had considerable success with this treatment. Bruns and Trendelenburg have used the same process in empyema, and the latter has employed it in tuberculosis of the lungs and other tubercular lesions. Garré suggests that fistulæ may be treated best by injecting the mixture into their walls and not along their canals. Dollinger's experiments with iodoform were not so satisfactory; he obtained good results only when bone disease had ceased and nothing but an abscess remained. Relapse after apparent cure in bone cases treated by iodoform seemed to be the rule.

Bresson [55 Apr. 26] calls attention to the fact that the old mercurial treatment of Scott for tubercular bones and joints has again come into vogue, being supported by such men as Suchard and Lucas-Championnière. The drug is used in form of a plaster.

Jassinski [2 Apr. 12] considers, as does Binz, the supposed curative action of balsam of Peru in tuberculosis to be due to the cinnamon which it contains. He claims to cure tuberculosis of the elbow in three to four weeks.

Osteomyelitis.—The causes of osteomyelitis are discussed in articles by Lannelongue and Achard, [14 May 28, Aug. 24] Rodet and Courmont, [211 Apr. 13; 3 Apr. 20] Courmont and Jaboulay, [211 July 13] Chauvin, [298 Mar.] Colzi, [376 Nov., Dec., '99] Berger, [152 Aug. 8] and Appenzell. [214 Apr. 1] Lannelongue and Achard conclude, from numerous experiments, that the streptococcus pyogenes occasionally produces osteomyelitis as well as the staphylococcus pyogenes aureus. They have demonstrated the streptococcus in 2 out of 16 cases. In experiments on animals, the streptococcus requires a much larger intra-venous dose than the staphylococcus, and is more apt to cause arthritis; but the staphylococcus more often gives rise to abscesses of the kidneys. They also found, in 13 cases of osteomyelitis, the staphylococcus pyogenes aureus five times, the staphylococcus pyogenes albus three times, and a mixture of these germs in one instance. A streptococcus differing from the streptococcus pyogenes was also found. The same authors likewise discovered the pneumococcus in a case of osteomyelitis. The typhoid bacillus has been reported from other sources, while Appenzell saw osteomyelitis follow measles, and regarded the bone affection as being due to plugging of the nutrient artery by

emboli of micro-organisms. Colzi, Chauvin, and Courmont and Jaboulay confirm these views; regarding osteomyelitis as caused by various germs or their mixtures, the staphylococcus pyogenes aureus, however, being by far the most common. The last-named investigator, along with Rodet, regards the staphylococcus pyogenes aureus and albus as being merely varieties of the same species, and gives them the common name of *staphylococcus pyogenes.* He also asserts that the staphylococcus pyogenes attacks the



RAREFYING OSTEOMYELITIS.
(*Münchener Med. Wochensch.*)

bone and periosteum, producing a typical osteomyelitis; while the streptococcus pyogenes attacks the medulla only, and is more diffuse in its action. Rodet and Courmont, on the other hand, although they admit that inflammation of bone may be due to various germs, consider the staphylococcus pyogenes aureus as the only cause of the the specific juxta-epiphyseal osteomyelitis of adults.

Other interesting articles relating to osteomyelitis are by Legueu, 100 Dec.14,'99 Trélat, 100 Jan.14 Oberst, 34 Apr.1 Fröhner, 336 Jan.26 and Haaga. 761 V.5,No.1; 514 Feb.

Legueu states that, in osteomyelitis of long bones, early resection, before necrosis is complete, should be made rarely, and should be confined to the exceptionally grave forms of the disease. Resection is indicated late in the disease when ossification has already begun, the acute symptoms have subsided, and the necrosis is too extensive for easy spontaneous elimination. Oberst calls attention to the rare cases of rarefying osteomyelitis in which bending of the bones occurs, the superior extremity of the femur being most frequently affected (see wood-cut, preceding page). But 4 reliable cases have been recorded.

Fröhner has collected 104 cases of acute spontaneous osteomyelitis of the short and the flat bones. The disease compares in frequency with that of the long bones in the ratio of 1 to 13.8. The os ilei (25) and scapula (24) were the bones most frequently attacked. Haaga, after a study of 403 cases of acute osteomyelitis of the long bones, concludes as follows: "1. The male sex preponderates over the female in the proportion of 3.38 to 1. 2. A large percentage, 42, falls between the ages of 13 and 17. Below 6 and beyond 19 there is considerable decrease; beyond 19, almost extinction. 3. No marked difference between the seasons (contrary to Kocher and Lücke). 4. No endemic multiplication; no difference between towns and rural districts. 5. Different causes are responsible,—cold, traumatism, overexertion, etc. 6. No differences in the sides of the body. 7. Three-fifths of all cases occur in the larger cylindrical bones, 38 between tibia and femur,—the latter more in the lower third, the former more in the centre of the shaft; 20 per cent. multiple. 8. When the disease locates in the middle third, the bone shows, as a rule, some elongation; when near the epiphysis, shortening. 9. In 189 of the entire number more or less aggravated disturbance of the adjacent articulations remained."

In inflammation of the epiphyseal lines of bones, Bardenheuer[69] cuts down to the seat of inflammation as soon as the trouble is discovered; and, although perhaps only a little discolored serum escapes, the symptoms are relieved. In the inflammations of the epiphyseal line of the acetabulum, he recommends an incision from within the pelvis, to avoid resection of the head of the femur. He enters the pelvis by a cut parallel to Poupart's ligament. Three cases are reported. In hip disease, with extensive inflammation of

the acetabulum and pelvic abscess, he recommends exposure of the abscess-cavity and resection of the acetabulum; and, if this be done early, resection of the head of the femur may be avoided.

Osteomalacia.—Articles on this subject have appeared by Kehrer,[69 Dec.5,'99] von Wagner,[113 Feb.9] Stilling and von Mering,[365 No.45,'99] Thomayer,[844 May 31] Roberts,[224 Aug.20] Hermann,[768 p.345] and Baumann.[2 Mar.] Kehrer believes in the mycotic origin of osteomalacia. He calls attention to the vulnerability of the vulvar epithelium, necrosis of which may be produced by solutions of 1-to-4000 sublimate or 2-per-cent. carbolic acid. In speaking of treatment, he lays great stress on long-continued warm baths and considers castration justifiable. Von Wagner recognizes a connection between disturbances of the mind and osteomalacia, because he finds osteomalacia forty times more frequent in the Vienna Insane Asylum than in the General Hospital.

Stilling and Mering have succeeded in producing genuine osteomalacia in an adult dog by excluding calcium from its food; while Roberts reports 2 cases following cancer of the breast. Hermann regards the disease, when present in infants, as merely a high degree of rickets. Baumann speaks well of Porro's operation of castration. He thinks that interference with the ovarian and uterine arteries exercises a reflex action on the dilated arteries in the bones, thus removing hyperæmia. Statistics of 44 operations show that 23 recovered and the remainder died. Thomayer, thinking that osteomalacia is due to an accumulation of acids in the blood, treats the disease with large doses of sodium bicarbonate. Cure results, he claims, in four to six weeks.

Roddick[282 Nov.] reports a case of fragilitas ossium in a boy aged 13, who had suffered twenty-seven fractures of the lower extremities.

Osteitis Deformans.—According to Thibierge,[860 Jan.; 212 May] 41 cases of this rare disease have been reported. It is manifestly a distinct general disease, arising from nutritive disturbances, although the cause is yet unknown. He emphasizes the frequency with which the disease is followed by malignant tumors. Maguire[6 May 8] and Griffiths[2 Nov.8] each report cases of osteitis deformans. Maguire mentions the fact that one of Paget's original 5 cases lived to be over 70 years of age, and that two sisters of this patient began to show signs of the same disease.

Hutchinson, Paget, and Edmunds[22 Nov.5,10] have written interesting papers on osteitis deformans. Hutchinson concludes "that it is

a disease chiefly of senile periods of life; that it may occur in either sex, but is more frequent in men; that it often happens to those who have a gouty family history; that it is probably more common in England than elsewhere; that it consists of a process of osteitis and periostitis, attended by the abundant formation of ill-developed new bone and the weakening to some extent of the old; that it is often in the early stages restricted to one bone; that it tends in all cases to become generalized, involving all the bones of the body; that it has no connection with syphilis, although it may be simulated by it, especially by the hereditary form; that it runs a very chronic course, lasting ten to twenty years, and, indeed, in itself, rarely causes death." Paget adds to these conclusions the facts that cancer or sarcoma is frequently present; that blindness seems at times to result; and that inherited tendencies are not manifest.

Marie [92 Jan.] separates a number of peculiar cases from the too general classification of acromegaly, and gives them a separate name,—"*osteo-arthropathie hypertrophiante pneumonique.*" The hands and feet are not simply enlarged, as in acromegaly, but they are also deformed, the same irregularity being noticed in other bones. A salient point of difference between the two diseases in question is the situation of the kyphosis. In acromegaly it is cervical or superior dorsal; in the other affection it is lower dorsal or lumbar. Marie thinks the disease is caused by chronic lung affections, and calls attention to the deformities often occurring in the fingers of consumptives. The characteristic lesions are probably due to ptomaines formed by micro-organisms in the lungs and acting on the osseous system through the circulation. Four cases are minutely reported. Spillmann and Haushalter [92 May] also describe a case of this disease.

Sutton [645 Mar. 9, '99] regards leontiasis ossea as a modification of rickets. He reports a case in a young man aged 24. The pathological changes of the skull in this case are shown in the colored plate.

Brown [2 Dec. 21, '99] describes a case of hypertrophy (not acromegaly) of the bones of the face and the hyoid bone, in a man aged 29. Bickersteth [1001 v. 22] reports a similar case, which, in addition, presented hypertrophy of the bones of the cranium. In both cases the wisdom-teeth were absent. Brown endeavors to explain the phenom-

Leontiasis Ossea (Sutton).
Illustrated Medical News.

Bark & Mc Fetridge, Lith. Phila.

enon by the diversion of the vascular supply from the wisdom-teeth to the bones of the face.

Humphrys[277 July] calls attention to senile hypertrophy and senile atrophy of the skull. The former is due to a shrinkage of the brain and consequent congestion of the vessels of the skull, the thickening taking place internally. The atrophy takes place from without, contrary to the atrophy of other bones. Both hypertrophy and atrophy may occur at the same time.

Kary[84 June 21] reports 2 cases of syringomyelia, and cases observed by Garré and by König are also mentioned. Fischer[84 Sept. 9] writes on hereditary syphilis in bones. In a child he found total necrosis of some of the long bones of the inferior extremities, with hæmorrhagic osteomyelitis and periostitis.

Fürbringer[84 May 5] speaks of bone-inflammations—osteoperiostitis, as he prefers to call them—following typhoid fever. Ebermaier showed that these inflammations may attack any bone, but usually the long bones are the ones implicated. The inflammation varies in intensity, and may or may not be purulent. Redner has seen bone-lesions follow typhoid fever in 5 cases out of 1600. The trouble may begin during the attack of typhoid, or even initiate an attack. Pain, as in syphilis, is most severe at night. Treatment is merely expectant.

The subject of phosphorus necrosis is reviewed by Haeckel,[226 v. 30, pp. 545, 661] and 56 cases are added to the literature of this disease. Like Wegner, he regards necrosis of the jaws as due to phosphorous fumes, and states that it begins as an ossifying osteitis and ends by death of the bone. He agrees with Ried that early resections give the best results and prevent the extensive necrosis which generally occurs under expectant treatment.

Chauvel[100 Jan. 23] reports 2 cases of caries of the ribs following abscess of the liver. Ole Bull[6 Oct. 11] suggests the use of a 4-per-cent. solution of hydrochloric acid and Caudwell[2 Mar. 1] the use of glycerin as dressings in necrosis.

Boeckel[168 Dec. 1, '99] reports a case in which a bullet lay in the ulna during thirty years without symptoms, and at the end of that period gave rise to osteitis and grave suppuration.

Netter and Mariage[3 June 11] saw 2 cases of suppuration of simple fractures, in one of which was found the streptococcus pyogenes, and in the other the pneumococcus; while 2 fatal cases of pyæmia,

closely following slight injuries without lesion of the skin, in children about 10 years of age, are reported by Bruns and Alexandrof.[852 Nov. 2,5]

BONE-GROWTH.

Ollier,[2 Aug. 16] in a paper before the Tenth International Medical Congress, affirms that there is no exception to the rule that no complete and permanent growth of bone can take place unless the periosteum surrounds it; necrosis will otherwise take place within six months.

Neve[36 Feb.] has made exhaustive inquiry into the regeneration of a portion of the shaft of a long bone after subperiosteal resection. He finds that the process of re-formation takes place both from the epiphyseal disk and the periosteum, especially the latter. He also concludes that the reticular embryonic tissue filling the cavity from which the bone has been removed may be rapidly converted into bone, and that cartilage-cells may be directly transformed into active bone-cells. Hence, "it is quite evident that bone formation is proceeding with the greatest activity in intimate relation to the periosteum, while the reticular tissue of the cavity possesses a much less but nevertheless distinct capacity for the formation of bone."

The changes occurring in joint-cartilages after exarticulation have been studied by Drushinin,[844 Oct. 4] who finds that the cartilages uncovered by synovial membrane undergo as much change toward the formation of bone in one week as those covered by such membrane do in six months.

Martha Sommer[13 Aug. 18] states that in 489 fractures treated at the Zürich Clinic, between the years 1881 and 1888, 6 cases of pseudarthrosis occurred, as well as 16 cases of delayed union. Also 8 cases of pseudarthrosis, already developed, presented themselves for treatment during this time. In no instance were severe constitutional troubles present, and in one case only were there much loss of blood and diarrhœa. Local conditions seemed to be the cause of the non-union.

Wyeth[101 Apr.] reports the regeneration of an entire clavicle with new joints, and Thompson[506 Nov.] the regeneration of a tibia (blood-clot method) after resection for necrosis.

Bone-Grafts.—Papers of interest have been written by Poncet,[91 Nov., '90] Gibney,[1 May 17] Goodman,[760 Jan. 4] Middendorff,[84 Feb. 15] Deaver,[9 Dec. 28, '90]

Kümmel,[34 Oct.28] and Murray.[6 Oct.4] Poncet succeeded in inducing the re-formation of a tibia in a child by filling the cavity with fragments of bone from a kid; 3⅛ inches of shortening resulted. Gibney used decalcified chicken-bone chips for a similar purpose. The chips failed to harden, and only answered the purpose of a packing. Chips of bone obtained from the patella were successfully used by Goodman to fill the cavities in the ends of the tibia and femur caused by curetting those bones during an excision. Murray and Middendorff report good results with Senn's method; while von Bergmann's and Lange's experiments have been unsatisfactory. Kümmel suggests, as an improvement on Senn's procedure, that the grafts be only partially decalcified.

BONE-TUMORS.

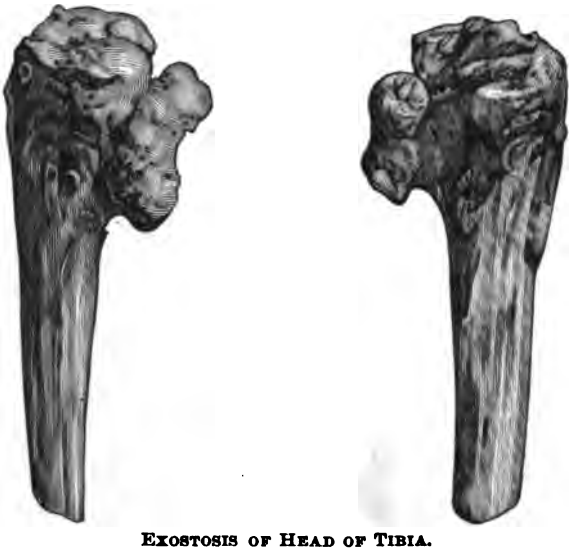
Exostosis.—Among the articles on multiple exostosis may be mentioned those of Pic,[363 Nov.25] Charboux,[208 Aug.15] Legroux,[100 July 22] and Bessel.[84 July 19] Pic reports a case with 194 exostoses, Charboux 1 with 40 and another with 30, and Legroux 1 with 50 tumors. Charboux also calls attention to a case of transmission of this affection from father to son and from the son to four grandchildren. He states that exostoses are found near the epiphyseal lines of the ends of the long bones from which the greatest growth takes place,—lower end of femur and upper ends of tibia and humerus. Legroux agrees with Vix that these exostoses may be the result of exaggerated bone formation, incident to a recovery from rickets.

Innes[557 Jan.] reports a case in which an exostosis of the head of the tibia caused gangrene of the foot and leg by pressing on the arteries (see figures, next page); while Braun[301 v.30,p.199] saw apparent complete ankylosis of the hip caused by an exostosis 9 centimetres in length extending downward from the anterior-superior spine of the ilium. Roger Williams[6 Sept.27] regards subungual exostoses of the great toe as overgrowths of rudiments of supernumerary toes, which are always confined, as are the exostoses, to the tibial side of the terminal phalanx of the great toe. The intimate structures of these growths also support this idea.

Malignant Tumors.—Borck[41 Apr.28] states that, out of 118 cases to be found in the literature of disarticulation of the hip-joint for malignant new formations of the thigh, only 36 can properly be used in compiling statistics as to recurrence of the disease. Of

these 36, 27 have died of internal metastases within from four weeks to four and a half years. Finally, it appears that in no case can we say that the patient has been lastingly cured of his disease. Hence the utility of the operation may be doubted.

Küster[4, Sept. 15] divides sarcomata of the long bones into primary periosteal and primary central sarcomata. They occur in young individuals near the epiphyseal lines, where islands of cartilage are often found. The periosteal form, in the femur, requires amputation at or near the hip-joint, while the central variety may often be effectively chiseled or scraped out. He reports 17 operations on 16 patients. Rose emphasizes the necessity of early



EXOSTOSIS OF HEAD OF TIBIA.
(*New Zealand Med. Jour.*)

radical operations, and mentions a case of amputation at the hip-joint for sarcoma in which there was no relapse at the end of five years. Hahn thinks that not only giant-cell sarcomata of the jaws, but also those of the long bones, offer a good prognosis after total or partial resection.

Neuhahn[41, Nov. 24] concludes that traumatism, although it may be the exciting factor in the development of sarcomata of the soft parts of the extremities, is not the true cause of these growths. He states that in only 20 per cent. of such tumors is traumatism given as a cause.

Westphalen[21, Nov. 11, '99] agrees with Virchow that bone-cysts are

always due to changes in solid new growths. He reports a case in which a bone-cyst was due to the breaking down of a primary, multiple, myelogenic sarcoma. Angeiomata and angeiosarcomata were formerly always considered as malignant, but Roughton[6 Dec. 14, '99] has shown that every gradation exists between the malignant and non-malignant forms.

Nasse[226 v. 39, p. 84.] reports 46 cases of sarcoma of the long bones occurring in von Bergmann's clinic since 1882, 20 being myelogenic and 20 periosteal in origin. Fracture was present in 6 of the central forms.

McBurney[9 June 21] operated on a small spindle-cell sarcoma of the thigh which had been growing for seventeen years, while Pollet[220 Oct. 24] reports an osteosarcoma of the femur of twenty-five years' standing. Wyeth[101 Sept.] removed a neurosarcoma from the popliteal nerve. Recurrence took place, which finally necessitated amputation at the hip-joint. Monestié[220 Feb. 28] saw a case of myxosarcoma of the inferior extremity of the radius in a patient with a distinct syphilitic history. He thinks the growth was at first syphilitic and subsequently became sarcomatous. A pulsating osteosarcoma of the head of the tibia has been observed by Walther.[7 Oct.]

Dubourg[188 Jan. 5] writes on hydatid cysts in the long bones, of which only 58 cases are on record. They may occur in any portion of the femur, and have a tendency to travel along and widen the medullary canal, which becomes lined with the cyst. They may remain latent, so that spontaneous fracture is the first sign of their presence. Hydatid "purring" is generally absent, and puncture is always necessary to a diagnosis. If the tumor is small, it may be excised; but if large, amputation is indicated. Moderate intervention is not palliative, but adds virulence to the growth.

A cholesteatoma, the size of a goose-egg, occurring in the frontal bone, and of seven years' standing, is reported by Wortruba.[8 No. 47, '99] Rider's bone is exhaustively discussed by Schmit,[91 Sept.] who does not advise operation in cases free from tenderness. An editorial calls attention[243 May] to the osteotomata occasionally developed by certain gun exercises, in the deltoid muscles of soldiers in the German army. The only treatment is removal of the tumor. Beevor[2 Mar. 1] reports a case of what might be considered as either an ossified scalenus muscle or a cervical rib.

Vollert [57 June 29] ingeniously supports Volkmann's idea that *periostitis albuminosa* is not a specific disease, but a result of the mucoid degeneration of a subperiosteal, periosteal, or parosteal abscess.

A hitherto undescribed trophic affection of the third phalanges, consisting of an enlargement of the tubercles at their bases, accompanied by pain, is mentioned by Rosenbach. [68 Aug.]

DISEASES OF JOINTS.

Phelps [1 May 17] bases on experiments with animals the following conclusions: "(1) that a normal joint will not become ankylosed by simply immobilizing it for five months; (2) that motion is not necessary to preserve the normal histological character of a joint; (3) that when a healthy joint becomes ankylosed, or its normal histological character changed, it is not due to prolonged rest, but to pathological causes; (4) that immobilizing a joint in such a manner as to produce, and continue, intra-articular pressure, will result in destruction of the head of the bone and the socket against which it presses; (5) that atrophy of the muscles of the limb will follow prolonged immobilization of a joint." "The question of ankylosis is determined by the severity of the inflammation, the duration of the inflammation, the presence of intra-articular pressure, the subsequent cicatricial contraction of soft parts around the joint, the tissues involved, and the amount of destruction of bone and cartilage. Inflamed joints treated upon the plan of absolute immobilization and the relief of intra-articular pressure furnish by far fewer cases of ankylosis, limited motion, and deformity." Power reports 50 consecutive cases of fracture of the elbow-joint treated by immobilization, without passive motion, with but 1 case of ankylosis resulting.

Bruce Clarke [645 Dec. 14, '99] reports 28 cases of operations upon joints in which the joint was opened, and in but one was subsequent amputation found necessary. Fifteen of these cases involved the knee. In 5 cases the patella was wired for fracture, and the patients were able to get about in six weeks to two months. Bending of the joint was begun in about four months, and became fairly complete at the end of six months. He counsels a longitudinal incision over the patella in wiring for fracture, so that, in case the bone should become refractured, a compound injury is not so liable to result. Scott [1 Nov. 8] reports complete and rapid recovery from a

compound comminuted fracture of the patella into the knee-joint, treated on strict aseptic and antiseptic principles. The patient was a sufferer from chronic diarrhœa and cystitis.

Smirnoff, of St. Petersburg, [650 Oct.17,'99] has found that not infrequently, in the course of an infectious disorder, the pathogenetic micro-organism peculiar to the affection may be detected in the synovia removed from articular cavities. His investigations comprise erysipelas, pneumonia, abscess, phthisis, typhoid fever, diphtheria, and gonorrhœa.

Buday [84 June 29] defines as "hæmatogenic" joint inflammations those in which the virus has been introduced through the blood; while Witzel [336 Aug.2] includes under the designation "rheumatoid" all affections of joints due to micro-organisms. The bone inflammations occurring in typhoid fever are determined, according to Witzel, by traumatism produced during the modern bath treatment.

Strümpell [34 Jan.14] states that chronic inflammations of the joints, with deformity, due to gonorrhœa, are not so uncommon as is generally supposed, and that these affections are perhaps often confounded with nervous diseases. He remarks that it is not yet settled whether the disease is due to a mixed infection or to the gonococcus itself.

Deutschmann [13 July 15] has seen two newly-born infants suffering from concomitant blennorrhœa and joint inflammations. In the secretions from the joints, as well as those from the eyes, typical gonococci were found. Gonococci were also demonstrated in a discharge from the mother's urethra. Henry Koplik [1 June 21] also reports 2 cases of arthritis complicating vulvo-vaginal gonorrhœal inflammation in children,—one 5 years of age and the other 3½. With Bumm and Baumgarten, he believes that the trouble is due to a mixed infection, and that suppurations other than those of the genital organs may produce it. Duplay [14 July 2] has likewise written on blennorrhagic hydrarthrosis and its treatment.

Stillman [67 Mar.8] gives some valuable points in the treatment of synovitis of the wrist, and Maclean [9 Sept.12] calls attention to the relief afforded in suppurative conditions of the wrist and in compound ganglion by subcutaneous division of the anterior annular ligament. McCurdy [16 Aug.] writes on the treatment of synovitis by elastic extension. Articles have appeared by Stillman on a new splint for the treatment of affections of the ankle, [779 July] and on a splint for inflammatory

conditions of the joints [234 Mar.]; while Taylor [99 Oct. 16] mentions a ready method for counter-extension at the knee.

Attention is called by Marano [267 July] to the beneficial, palliative effects of electricity in the treatment of articular diseases, in the relief from pain and other annoying symptoms. Noble Smith [2 Feb. 22] recommends drilling into the bones in the neighborhood of inflamed joints and injecting carbolic acid (1 in 40), thus relieving pain and hastening recovery.

Fenster [96 Oct.] writes extensively on ignipuncture in affections of joints and bones. The operation is especially indicated (1) in non-suppurative, granular, or fungous articular inflammation starting from the epiphyses, and of traumatic origin; (2) in cases of chronic primary osteomyelitis of epiphyses of long bones, without serious implication of joints; (3) in rarefying osteitis of short bones, especially of the foot in children. A single operation is generally sufficient.

Monks [99 Aug. 21] suggests a new method of treating injuries to the shoulder in which there is persistent pain and tenderness or inability to raise the elbow from the side. The principle involved is that the shoulder is more perfectly in a position of actual rest when the arm is supported at right angles to the trunk. This is accomplished by a platform-splint. Monks has cured two-thirds of his cases in from a few days to a few months.

Collins [2 Apr. 19] advises, as a treatment for chronic rheumatic arthritis, that the patient be chloroformed, the joints freely and fearlessly moved, and the flexors and extensors roughly massaged. This procedure causes absorption of the deposits and relieves largely the symptoms of the disease.

Falcoz [360 Sept. '89] reports 16 cases of hydrarthrosis treated by puncture, with 13 permanent cures. Ten were treated by simple puncture and 6 by puncture followed by antiseptic irrigation (5-per-cent. carbolic-acid solution). The essential factor of success is that no acute inflammation be present. Huntington [147 Apr.] also reports 5 cases. He likewise uses a 5-per-cent. solution.

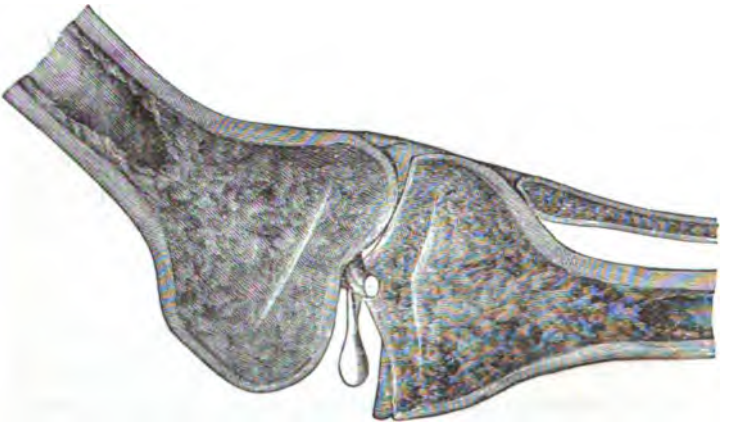
Dubrueil [853 Sept.] writes on "pseudo-hydrarthrosis of the knee," referring to hydrops of the bursa beneath the patellar ligament. Articles have appeared on the acute arthritis of infants by Townsend [5 Jan.] and Ryan. [426 Oct.] Townsend tabulates 71 cases, 45 per cent. of which died. In 52 cases but one joint was affected,—

mortality, 34 per cent. In 15 cases more than one joint was involved,—mortality, 75 per cent. The joints most frequently diseased were the hip (37), the knee (26), and the shoulder (12). He regards the disease as an osteomyelitis, due to the staphylococcus pyogenes aureus, and most frequent during the first year of life. The pus should be evacuated as early as possible, its seat being generally in the epiphysis, near the joints. In an article on the "Beginning of Joint Diseases in Children," Hammond[6 Feb. 22] analyzes 158 cases of joint disease treated at the Ormond Street Hospital during the years 1879 and 1880, 56.9 per cent. of which were of the hip. Joint troubles comprised 5.5 per cent. of all cases treated in this hospital. He had seen no cases in which disease began in the head of the radius or in the olecranon.

Arthrodesis.—Karewski[4 Dec. 22, '90] read a paper on this subject before the Berlin Medical Congress. During the discussion which followed, Julius Wolff spoke against the operation when taken in its full meaning,—the destruction and ankylosis of a joint. He favored an attempt to bring the joint surfaces together by wiring, etc., without destruction of the joint itself or the production of total ankylosis. Hahn strongly recommended apparatus, in preference to operative interference, in limbs affected with infantile paralysis. Karewski, in closing the discussion, emphasized the point that arthrodesis should not be made until all hope of restoration of muscular activity is gone, and until the joint has become utterly useless. Mere fixation of the joint, as recommended by Wolff, would answer in cases of paresis, but not in cases of hopeless paralysis. In these views he is supported by Rochard and by Schüssler,[4 May 5] who recommends his special form of apparatus as preferable to Wolff's operation (called by Eulenberg "arthrorrhaphy"). Rochard[853 Feb.] also writes extensively on arthrodesis. He considers the operation a good and justifiable one in suitable cases. It is necessary to remove only a thin section of the cartilages, so as not to shorten the limb or compromise its growth. Out of 53 operations, 30 were for infantile paralysis, 2 for paralysis following traumatism, 1 for atrophy due to typhoid, and 1 for a similar condition succeeding variola. Relaxation of the ligaments, as in flat-foot; pointing of a Chopart stump; or paralytic club-foot, may be treated in this way. The number of operations on record is 80, in which the results have been, in general, satis-

factory, although bony ankylosis has not always been obtained. It is not advisable to induce suppuration for the furthering of bony ankylosis, as recommended by Albert.

Foreign Bodies and Loose Cartilages.—Articles deserving of mention in this connection are by Schüller, 69 Aug. 7 Patterson, 277 Apr. Löwenstein, 69 Feb. 27 Guyon, 33 Jan. Pye, 6 Feb. Larsen, 41 Apr. 24 and Berry. 2 Oct. 28 Larsen regards the pain occurring with foreign bodies in the joints as due, not to pinching of the body between the joint surfaces, but to stretching of the capsule that takes place when the body lies in certain positions outside the joint surfaces. Schüller emphasizes the absence of danger in free incisions into joints made under aseptic precautions. In order to remove loose bodies which are



LOOSE BODIES IN THE KNEE-JOINT.
(*Deutsche Med. Wochensch.*)

firmly wedged between the articular surfaces, without injury to the joint, he makes a limited internal or external longitudinal incision, and then bends the leg inward or outward, so as to separate the joint-surfaces sufficiently to remove the body (see figure). If not carried too far, this bending does not injure the ligaments. Guyon mentions that Larrey's statistics, before the days of asepsis, show a mortality of 13 per cent. with the subcutaneous method and 22 per cent. with direct incision into the joint. When the operation is done aseptically, Jalaguier puts the mortality at 0.95 per cent. Patterson thinks that, "in the majority of cases, loose bodies of mixed cartilaginous and bony nature are wandering osteophytes, and are evidences of a rheumatic arthritis, either

manifest or latent." Guyon, on the other hand, regards them as of traumatic origin. If the cause of the trouble is not found at once in the anterior section of the joint, Löwenstein advises thorough investigation of the remainder of the articulation. Berry removed 50 loose cartilages from a knee-joint, and reports a case in which Thomas Smith found 400. Pye operated successfully on a case of luxation of the internal semi-lunar cartilage. Allingham has found 23 of these cases on record. He advocates suturing the cartilage to the head of the tibia.

At the Berlin Surgical Congress, Jena read a paper on *osteochondritis dessicans*, in which disease a large part of the bone and cartilage of the articular surface becomes, through some obscure process, separated and loose in the joint.

Syphilitic Arthritis.—Among those who have written on this subject are Cheminade,[188 Jan.19,26] Rubinstein,[57 Sept.26] and Trinkler.[4 No.26] Rubinstein publishes statistics of 43 cases treated in Schüller's clinic,—1 from secondary syphilis, 26 tertiary, and 16 hereditary,—in children from 3 to 16 years of age. During the last year and a half Schüller has seen 328 cases of joint inflammations, of which 6½ per cent. were syphilitic in origin. The capsule in syphilitic inflammation of joints often becomes hardened in spots, and lacks the uniform, doughy feel of tuberculosis. He also emphasizes the nocturnal pains in syphilis.

In housemaids' knee, Wight[157 Mar.] recommends scraping and cutting out the wall of the bursa and bringing the cavity together with deep sutures, so as to obtain primary union; while Fowler reports good results with Schede's blood-clot method. Clutton[6 Feb.1] writes in favor of the excision of bursæ in the neighborhood of large joints, and reports 2 successful cases.

Terrillon[73 June 14] considers contracture of the biceps in arthritis of the elbow as reflex in its nature. It leads to adhesion by fixation of the joint, and persists, with great tenacity, after the arthritis has disappeared. Forcible stretching, etc., only irritates the muscles and aggravates the trouble; but rest by immobilization is often sufficient. In older cases, compression, massage, douches, etc., may be employed to advantage, and gentle elastic traction is frequently very effective. Finally, it may be necessary to divide the biceps tendon.

Wood[2 Dec.14,'99] reports a case of "arthritic hæmoptysis," following

rheumatism, in a man aged 74, who presented no evidences of tuberculosis or disease of the heart.

Eve $_{\text{Oct.22}}^{2}$ exhibited before the London Pathological Society a number of bones taken from the tombs at Gurob (1300 B.C.), which showed periosteal deposits, together with well-marked osteo-arthritic articular changes.

PLASTIC SURGERY.

Skin-Grafting.—Thiersch's method has been used extensively during the past year, both in America and elsewhere, with a good proportion of successes. Among a large number of articles may be mentioned those by Garré, $_{\text{Mar.22}}^{336}$ von Hacker, $_{\text{May 8}}^{8}$ Witherspoon, $_{\text{Jan.28}}^{82}$ Hendrix, $_{\text{Apr.20}}^{276}$ Brockway, $_{\text{Feb.}}^{761}$ Goldmann, $_{\text{No.1}}^{851}$ McBurney, $_{\text{Oct.25}}^{59}$ Sophia Ivanova, $_{\text{Nov.}}^{96}$ and Duménil. $_{\text{Mar.15}}^{203}$ Garré has made a thorough investigation of the histological changes incident to the healing-in of skin-grafts cut according to Thiersch. He found, in nearly all cases, a stratum of exudation, consisting of fibrin and blood-corpuscles, uniting the grafts with the underlying tissue, which stratum finally became organized. In the course of nine hours, leucocytes invaded the grafts by way of the empty vessels. Some of these vessels filled with blood, but most of them were obliterated and their places taken by new ones, which grew into their lumina. Epidermic transplantations, he concludes, offer better chances of success than if the skin be included; also, the wound should be as dry as possible, because the thicker the layer of blood, the slower the process of healing. Witherspoon, however, advises grafting upon a thin blood-clot, as he thinks the grafts take better and are not so liable to be raised up by pus forming beneath them.

Von Hacker reports cures of crural ulcers in 3 cases out of 5, by Thiersch's method, and Brockway in 3 out of 6. The transplanted skin must be very carefully guarded against trauma and disturbances of the circulation until it become movable upon the underlying structures, or else relapses may easily occur. McBurney has had an experience of 24 cases. He does not think an anæsthetic has a bad effect upon the vitality of the grafts. With him, the time required for healing varied from one week to two months. Von Hacker has had success with 3 tubercular ulcers. Goldmann has employed the method satisfactorily for cancerous ulceration; and states that transplantation succeeds best in tumors rich in

blood-vessels and poor in cells, and that the grafts must be as thin as possible. Duménil[203] subdues the pain attendant on the cutting of skin-grafts by first injecting a solution of 5-per-cent. cocaine, so as to raise a vesicle at the point from which the graft is to be removed.

Sophia Ivanova[96] reports a successful case of extensive skin-grafting in an old lady aged 75, in which the grafts were taken from newly-born infants one and one-half and two hours after death. Infantile tissue, she thinks, grows better than that of adults. The transplantations should be made as early as possible, and with large grafts. It is sufficient merely to thoroughly wash the granulating surface.

Other articles on skin-grafting are by Poncet,[853] Cervera y Ruiz,[41] Vergely,[188] Berthold,[4] Symonds,[2] Van Meter,[96] Grandmont,[24] Schmitz,[21] and Sawicki.[844] Vergely has successfully treated extensive syphilitic ulcerations of the leg and thigh by dermo-epidermic grafts. Berthold closed a perforation of the tympanum with a skin-graft. Symonds has successfully employed grafts from amputated limbs, Grandmont from frogs, and Van Meter and Miles[6] from hairless Mexican puppies. Miles thinks the skin of young puppies grows better than that of older ones. Schmitz removed a large angioma from the scalp by means of two oval incisions. He subsequently united the skin at the extremities of these incisions, and then filled in the remaining central deficiency with the ends of the section of scalp removed.

In an article on experimental investigations on the transplantation of mucous membrane, Djatschenko[365] comes to the following practical conclusions: (1) the graft must be closely pressed against a clean raw surface free from blood; (2) the graft must be washed off in a warm 0.6-per-cent. salt-solution, in which it may remain as long as one and one-half hours without damage; (3) all fat must be removed from the under side of the graft, but not the entire submucous cellular tissue, as that would disturb the regeneration of the circulation; (4) strong antiseptic solutions must not be used—the transplantation must be merely aseptic; (5) the graft must cover the entire wound, or a scar will result; (6) the graft must be protected from becoming dry. Complete adherence takes place in about nine days.

In order to obtain good results in cheiloplasty and prevent

shrinkage of the new lip, Sawicki [844 Oct.28] recommends one of three methods: (1) the use of a double flap according to Israel; (2) the use of a single flap with the epithelial surface inward, the raw surface being covered with grafts according to Thiersch; (3) the employment of a similar flap with the grafted surface inward, the operation being completed at two sittings.

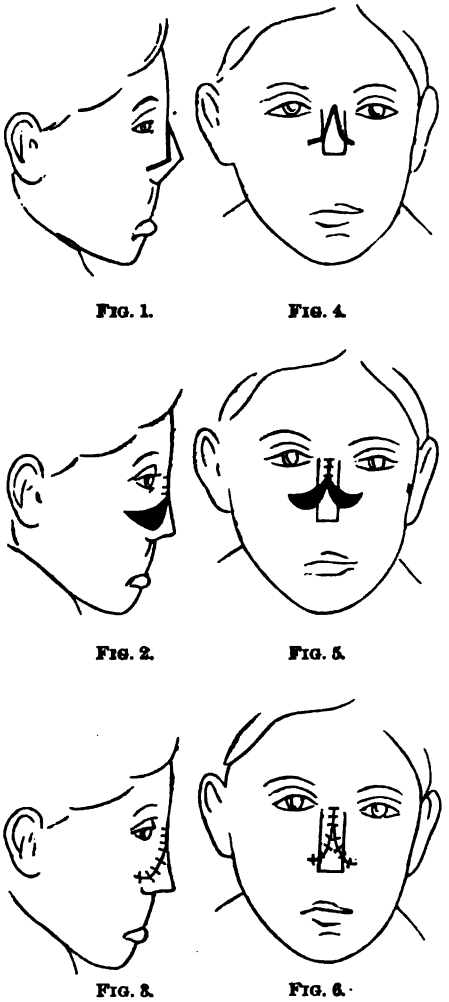


FIG. 1. FIG. 4.

FIG. 2. FIG. 5.

FIG. 3. FIG. 6.

RHINOPLASTIC OPERATION.
(*Berliner klin. Wochensch.*)

Julius Wolff, [4 Feb.10] in order to close defects in skin and bones, loosens the integument from the subjacent tissues over large areas in the neighborhood of the defect, which he is enabled to close by stretching the skin and holding it in place by sutures. In one case the skin was loosened over almost a third of the entire lower extremity, in order to remedy a loss of tissue resulting from an arthrectomy of the knee. Cavities in bone, ulcers of the leg, etc., may be covered by this method.

Nose.—Julius Wolff [4 June 28] describes a new and very successful rhinoplastic operation in which the portion of the nose remaining is divided into two halves, leaving attached to the lower half a tongue-shaped flap of skin and bone cut and chiseled out of the upper half and, if necessary, the tissues superior to it (see Figs. 1 and 4). The lower half, including the flap, is pulled straight downward, and the sides of the incision from which the flap was removed brought together, the upper point of the flap being sutured to the lower portion of this line of union (see Figs. 2

and 5). The edges of the remaining lateral wound surfaces are now brought together by sutures (see Figs. 3 and 6.) The author has operated on 3 cases, including 2 "saddle-noses," with astonishingly good results. The new nose retained its form in every way, no deformities of the forehead or cheeks being produced, as in older methods. He suggests that the same principle be used in operations in other regions of the body.

Kelley $^{760}_{\text{Aug.16}}$ replaced the soft parts of a nose an hour after they had been severed by an accident, and succeeded in getting union.

Rupture of Muscles.—Hochstetter $^{3}_{\text{May 22}}$ reports a rupture of the long head of the biceps muscle, with secondary suture and recovery; and Cutter $^{1}_{\text{Mar.22}}$ reports complete rupture of the quadriceps extensor muscle successfully treated by mechanical means. Huzza $^{101}_{\text{Sept.}}$ recommends the use of Martin's bandage in the treatment of these injuries.

Tenorrhaphy.—This subject has been considered by numerous writers, among whom are Schreiber, $^{34}_{\text{July 22}}$ Schüssler, $^{8}_{\text{Jan.30}}$ Eliot, $^{1}_{\text{July 26}}$ Reboul, $^{7}_{\text{No.25,'99}}$ Partsch, $^{855}_{\text{No.11,'99}}$ Brunner, $^{214}_{\text{Oct.1}}$ and Lindner. $^{34}_{\text{Nov.4}}$ Schreiber says that in the suturing of divided tendons, if the surgeon cannot be sure of asepsis, the wound had better be left open. He recommends Wölfler's suture, with catgut, for most cases. At the end of about fourteen days slight, passive motion may be begun and gradually increased and followed by massage, electricity, etc. In defects in tendons, the insertion of some aseptic animal substance (catgut, etc.) would, perhaps, be just as likely to produce a good result as some of the more complicated methods of Hüter, Czerny, Wölfler, and others. Schüssler recommends active and passive motion in the third week where the extensor tendons of the fingers have been sutured, and in the fourth week where the flexors are concerned.

In Billroth's clinic, the method usually employed is to ligate small bundles of fibres on either side of the ends of the tendon and tie the ends of the ligating threads. When there is much separation of the fragments, the proximal end of the tendon is drawn down and a stitch taken through it and the skin together (Nicoladoni).

Reboul has had an opportunity of examining the point of union of the median extensor tendon of the hand, one year after its suture for complete division (see Figs. 7 and 8). Partsch

reports a case in which the peripheral ends of the flexor sublimis and profundus of the left index finger were sutured to the flexor tendon of the middle finger; not only was complete movement of the index finger finally secured, but movement independent of the middle finger.

In an article on the treatment of subcutaneous rupture of the ligamentum patellæ, Brunner $\frac{214}{\text{Oct. 1}}$ contends, in spite of former statistics, that it is possible to get good results in this rare accident without resorting to operative procedures, and reports a successful case. He pulls the patella down toward the tuberosity of the tibia, and holds it there by means of an apparatus slightly varying from Trélat's modification of Malgaigne's hook-method of treating fractures of the patella. Lindner reports subcutaneous rupture

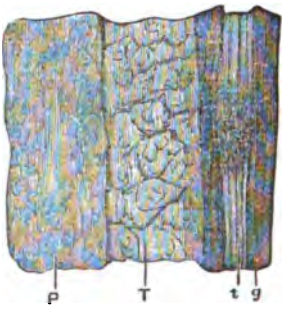


FIG. 7. SUTURE OF TENDON. FIG. 8.

P, skin: T, subcut. cel. tissue; t, g, tendon and its sheath.

Tendon at the point of suture (enlarged).

(*Bulletin de la Société Anatomique.*)

of the tendon of the extensor pollicis longus treated successfully by position.

Glück $\frac{4}{\text{May 12}}$ demonstrated, with considerable success, before the Berlin Medical Congress, the possibility of replacing lost portions of the higher tissues—nerves, bones, tendons, muscles, etc.—with appropriate aseptic materials. In case of a defect in a long bone, he unites the fragments with a medullary plug of ivory, and even goes so far as to manufacture artificial joints from ivory plugs with properly-expanded ends. These plugs are perforated in various directions, and eventually become replaced by granulation tissue. For nerves and tendons he employs catgut. In an experiment on an animal, where the tendon of a terminal

phalanx failed, he perforated the phalanx and inserted an ivory plug, to which he attached a thread of catgut, the other end of which was fastened to the extremity of the tendon. The experiment was successful. In cases of hæmorrhage, absorbable tampons may be employed, which heal into the wound,—catgut, silk, sponge, fresh coagula from animals, etc. He also replaced, with good success, sections of muscles, and even whole muscles, by muscle taken from the same or another animal, or a different species of animal; and he demonstrated that other substances might be employed for the same purpose. In all these experiments the strictest aseptic and antiseptic precautions are necessary. Glück presented a number of patients.

Munk, [169 Sept.] operating in Bruns's clinic, has also had success with the ivory-plug method in the treatment of pseudo-arthroses and kindred disorders. He says that the procedure originated with Heine.

Magnus, [34 July 29] basing his belief on experiments with animals, claims that transplanted muscle is promptly absorbed, and that the defect is filled in by budding from the remaining portions of the original muscle. It may be possible, however, to replace long sections of muscle by fibrous tissue in this way, although other substances than muscle itself would answer better for the purpose.

Wounds of Arteries.—Jassinowsky [13 May] concludes, from numerous experiments on animals, that the suturing of wounds in arteries is a perfectly feasible procedure. Union by first intention is always obtained, and there is no subsequent danger from hæmorrhage, thrombi, or aneurism. The strictest asepsis is necessary, and not more than half the circumference of an artery must be sutured. During the operation the blood is shut off by clamps on each side of the wound, and only the adventitia and media are included within the stitches. The vessel-sheath and fascia are also carefully united.

Agnew [112 Oct.] calls attention to injuries of the peroneus longus tendon and its sheath. Treatment consists in fixation, with the foot in abduction, and subsequent use of a shoe with the sole elevated on its outer edge.

Rau [59 July 19] successfully replaced the badly-comminuted metacarpal bone of the index finger by the metacarpal of the otherwise crushed thumb. In discussing the reunion of severed fingers,

Zatvarnitzky, of Arkhangelsk, Russia, says that when the soft parts are not extensively crushed reunion may be obtained even several hours after the accident.

FRACTURES AND DISLOCATIONS.

By LEWIS A. STIMSON, M.D.,
NEW YORK.

FRACTURES.

Massage.—Demmler[243 Mar.] reviews a thesis on the treatment of fractures of the upper end of the humerus by massage, written by Cadet[1019] under the inspiration of Lucas-Championnière, and adds the results of his own observation of its use in other fractures near joints. It is claimed that it hastens the formation of the callus, rapidly dissipates extravasated blood, and thus diminishes muscular contraction and feebleness and materially shortens the period of repair. Crickx [219 v.4,p.625] and Lebrun [219 v.4,p.630] have written in the same sense, limiting the treatment to fractures near joints, and Lucas-Championnière [212 Dec.,'89] returns to the subject in a lengthy paper. In fractures with but little tendency to displacement he uses massage daily from the beginning; in others he waits a few days to allow the process of repair to partially immobilize the fragment.

Phosphide of Zinc.—De Varona [6 Sept. 27] found repair of fracture to proceed much more rapidly in patients who were receiving from ¼ to ½ grain (0.016 to 0.032 gramme) of phosphide of zinc daily than in others not thus treated.

Non-Union and Delayed Union.—W. H. Sherwood, [59 Sept.13] referring to McEid's case quoted in the ANNUAL, 1890, reports another successful case of implantation of pieces of bone taken from an animal. The patient, a man 27 years old, had broken both bones of the forearm, and the fracture had remained united about six months. The intermediate fibrous tissue was removed, the ends of the bones freshened, and nine pieces of a rabbit's femur, each a complete segment of the bone ¼ inch thick, were placed in the gaps and the wound closed over them. Four months later four of the pieces were removed through one of the wounds which had not wholly closed. Six months after the operation the union was complete and the man at work.

Vertebræ.—Bell[282 June] and Jaboulay[211 June 22] have each reported 2 cases of operation after fracture of the spinal column. In both of Bell's cases the fracture was in the lower part of the cervical spine, and the injury was recent; the arches of the fifth and sixth vertebræ were removed and the dura opened. No displacement was found; in one the cord was found to be crushed, in the other it appeared to be normal; but at the autopsy (death on the fourth day) it was found to be softened. The other patient also died on the fourth day.

In Jaboulay's first case the fracture was of the sixth dorsal vertebra, and was recent; he removed the arches of the fifth, sixth, and seventh, and found "no bony obstacle in the lumen of the canal." An incision of the dura gave exit to a considerable amount of blood from the subarachnoid space. Death eighteen days later. In the second, the injury, a fracture in the dorso-lumbar region, had existed four months, with total paralysis and œdema of the lower limbs. After removal of the arches of the twelfth dorsal and first and second lumbar vertebræ, a prominence could be felt in the anterior wall of the canal which "must have completely obstructed it by counter-pressure against the arch of the underlying vertebra." The œdema diminished; the patient died five months after the operation. In both cases the cord was diffluent at the seat of fracture. In the discussion that followed the presentation of these cases, the opinions expressed were generally unfavorable to operative interference.

Clavicle.—Four cases have been reported during the year of that rare accident, *simultaneous fracture of both clavicles.* In J. Wm. White's[112 Jan.] the mode of production was not known; union was promptly obtained by dorsal recumbence. In Owen's[6 July 5] the injury was caused by a fall down stairs; both fractures united promptly, but with some deformity on the left side. The reports of the other 2 cases (Page[6 July 12] and Boyer[6 July 28]) were called out by Owen's remarks on the rarity of the accident; in Page's patient the injury was caused by compression of the shoulders between two railway-cars; in Boyer's by a fall from a horse. In the former good union was obtained by keeping the patient on his back in bed; in Boyer's the same position connected the displacement, but the patient refused to remain under treatment, and the final result is not known.

Coracoid Process.—A. H. Young $_{\text{Dec. 11,'99}}^{2}$ presented a specimen of fracture of the coracoid found in the dissecting-room; there was fibrous union, with separation of $\frac{3}{8}$ inch. J. B. Field $_{\text{Apr. 24}}^{99}$ reports a case of the same injury in a boy 5 years old, and, although the diagnosis is questioned by J. H. Packard, $_{\text{May 15}}^{99}$ it seems to me to be as fully justified as in Morgan's case, $_{\text{Dec. 14,'99}}^{2}$ which Packard accepts.

Humerus.—Croft $_{\text{Mar 29}}^{6}$ reports a *fracture through the anatomical neck*, with dislocation of the head into the axilla. After an ineffectual effort to replace the head under an anæsthetic, "an incision was made along the anterior fold of the axilla" and exposed "the head of the bone lying loose just below the glenoid cavity." Apparently the head of the bone was removed, although the report does not so state. Primary union. Three months later the patient "could close his fingers with some degree of force and could with difficulty get the hand to his mouth. He had some mobility at the shoulder-joint, but very slight voluntary power."

Separation of the Upper Epiphysis of the Humerus.—F. W. Murray $_{\text{Jan. 9}}^{1}$ reported a case, in a patient 17 years old, with displacement of the end of the shaft inward, in which he found it necessary to excise $\frac{3}{4}$ inch of the shaft. In the discussion Lange reported a similar case in which an operation had been necessary to correct the displacement.

Os Magnum.—Moty $_{\text{June 17}}^{100}$ reports a case of injury to the wrist by indirect violence, in which he made the diagnosis of fracture of the neck of the os magnum on the symptoms of an abnormal prominence, localized tenderness, and crepitation at the corresponding point on the back of the wrist. Convalescence was prolonged, four months.

Ribs and their Cartilages.—Schwalbe $_{\text{May 15}}^{69}$ reports a case of multiple injuries of the ribs and their cartilages by the passage of a heavy wagon across the chest. The second to the seventh ribs on the left side were broken in the axillary line; the second, fifth, and sixth left costal cartilages were fractured, and there was also, apparently, a costo-sternal dislocation of the left third and fourth and right third and sixth cartilages. The patient recovered promptly.

Massei $_{\text{Apr. 26}}^{2}$ and Hawley $_{\text{May}}^{139}$ report cases of fracture by muscular action; the former in coughing (left eighth rib, behind), the latter in vomiting (right ninth rib, in front).

Turres [112 Nov.] reports 2 cases (tenth rib in coughing, sixth rib in an effort to lift a heavy body), and collects and analyzes 40 reported cases, showing, among other conclusions, that of 49 fractures only 5 have been above the sixth rib; that the injury occurs more frequently on the left than on the right side and in men than in women, and that the seat of fracture is usually in the middle or anterior third of the rib.

Pelvis.—Nickerson [69 Mar.6] reports a case of fracture of the *anterior superior spine of the ilium by muscular action.* The patient, a lad aged 17 years, while running, felt something give way, and was unable to walk; the symptoms were tenderness, crepitus, and mobility on pressure. Nickerson adds abstracts of 4 other reported cases.

W. P. King, [82 Oct.16] in a case of compound traumatic separation of the pubic symphysis, wired the bones together and made an ingenious pelvic splint of plaster of Paris, so fashioned that the wound could be readily dressed without removing it. Subsequently, a pelvic clamp of iron was made, the splint being used as a pattern, and the parts were kept immovable during twenty-eight days of delirium. The ultimate result was good.

Femur.—Humphry [6 Aug.2] presented to the Cambridge Medical Society a specimen of *bony union after fracture through the narrow part of the neck of the femur* (" intra-capsular "). The patient was a man 80 years of age; he died a year after the accident. " The head is somewhat below its proper level. Solid bony union has taken place in the anterior half, so that the line of fracture can scarcely be traced, whereas in the posterior half the union is fibrous only. The latter shows the line of the fracture to have been near the head. The cause of the union being bony in the fore part and fibrous only in the hinder part is not quite clear, and it cannot be determined whether the fibrous and synovial investment of the neck had been torn in any part or had escapd lesion." The specimen is valuable because of its unquestionable character and rarity.

Loreta [9 Feb.1] treated an *ununited fracture of the neck* of the femur, that had existed more than a year, in a man 40 years old, by exposing the fracture through a posterior incision, freshening the surfaces of the bone and uniting the fragments by twelve metallic sutures, which were withdrawn " a few days after the operation." Good recovery, with a useful limb.

Townsend $_{\text{Apr.19}}^{1}$ treated a *fracture of the shaft* of the femur in a boy 9 years old, that had remained ununited for two and a half months, by applying a long, orthopædic hip-splint, which enabled the boy to leave his bed. Good union was obtained in two months.

Mudd $_{\text{May 10}}^{9}$ writes persuasively in favor of treatment of fracture of the shaft by Hodgen's suspension-splint, and describes in detail the method of use.

Patella.—Notable papers, embodying many personal cases, have been published during the year by Bull $_{\text{Mar.22}}^{59}$ in favor of non-operative treatment, and by Phelps $_{\text{May 21}}^{1}$ and Fluhrer, $_{\text{June 7}}^{59}$ together with a pamphlet by Lucas-Championnière, in favor of arthrotomy and metallic suture. Ceci reports 18 cases successfully treated by his method of subcutaneous wire suture through the patella, and Stimson $_{\text{May 10}}^{1}$ 25 cases treated by subcutaneous silk suture through the tendon of the quadriceps and the ligamentum patellæ, as described in the ANNUAL for 1890.

Leg.—A convenient method of making a plaster-of-Paris dressing for a fracture of the leg, and applicable to some fractures of other bones, has been described by A. G. R. Foulerton $_{\text{June 28}}^{6}$: "In the case of a fracture, say, at the junction of the middle and lower thirds of the leg, three measurements are taken: (1) the length of the limb from 1½ inches above the knee to the sole of the foot; (2) the circumference of the thigh at the level of about 1½ inches above the knee; (3) the length of the foot from the heel to the ball of the big toe. An oblong piece of shrunk house-flannel or old blanket is then cut out, of such dimensions that it is one way 1¼ inches longer than 1, the other way 1½ inches less than twice the measurement of 2. The limb is laid on the piece of flannel, which is then held up by its edges, supporting the leg as in a sling. Next, the flannel is tacked together with needle and thread close to the limb, down the front of the leg, along the sole, and then along the dorsum of the foot. It is better to sew the flannel up in the order given,—along the sole first and along the dorsum afterward,—because by doing so the foot will be held by the flannel in the position in which it should be,—at a right angle with the axis of the limb. The leg is thus closely encased in flannel, whilst along the front of the leg and dorsum and sole of foot a double free edge of flannel of greater or less extent is left beyond the seam. These free edges along the dorsum of the foot, as high

as the ankle, and along the sole, are trimmed off close to the seam. There now remain two considerable wings of flannel extending down the front of the leg as far as the ankle. Each wing, when turned back from the middle line in front, will reach to within ½ inch of the middle line behind. These wings are then trimmed from below upward so as to shape them to the form of the leg. Two side-splints with rectangular foot-pieces are then cut out of flannel, similar in shape to those used in a 'Croft.' They are cut out so that each piece, when applied to the limb, shall reach to within about ¼ inch of the middle lines in front and behind. Care must be taken that the anterior edge of each side-piece is quite straight; the posterior edge may be shaped so as to allow for the swelling of the calf-muscles. Traction is then applied to the limb, and these side-pieces, having been thoroughly saturated with plaster-of-Paris solution, are placed over the flannel casing, one on each side of the leg. The wings of flannel are then quickly folded back, each over its respective side-piece, and smoothed down. Some plaster solution is then rubbed well into the outer surface of the two flannel wings, avoiding, however, a border about ¼ inch wide, and extending down the front of the leg on either side of the seam. The perfect adaptation of the splint to the limbs may then be secured by applying a thin muslin roller bandage over the whole from the toes upward. After ten minutes the muslin bandage is unrolled, and the splint is then finished. The plaster will probably be quite dry in the course of an hour or so. When the splint is completed it will be seen that next to the skin there is a continuous casing of flannel; that outside this there is on either side, except just below the ankle, a double thickness of plaster-saturated flannel; that along the middle line behind there is a sort of hinge formed by the single thickness of plaster-free flannel of the original casing, and that each anterior edge, when the splint is opened, is formed by a fold of soft flannel. This latter is of importance, as the skin is thereby protected from uncomfortable pressure of the anterior edges of the plaster-saturated side-pieces."

DISLOCATIONS.

Clavicle.—Stimson [1] reported a case of habitual dislocation of the sternal end of the clavicle forward, successfully treated by peri-articular injections of alcohol. The same treatment was suc-

cessful in another case in April, 1890, and in a third reported by Townsend.[1 Apr. 14] It is a simple and apparently efficient means of remedying a disability that has heretofore been very intractable.

Shoulder.—As the comparative frequency of avulsion of a portion of the greater tuberosity of the humerus in anterior dislocations of the shoulder is still called in question by some, it is of interest to note that, in connection with the presentation of a specimen of avulsion of the portion corresponding to the upper two facets, by Berthet,[211 Mar. 28] before the Lyons Société des Sciences Médicales, Poncet stated that he had frequently found it at the autopsies of recent dislocations, especially in elderly people.

In a case of habitual dislocation reported by Schüller,[69 July 17] a woman, 37 years old, who had suffered so much by frequent recurrence that the head of the humerus was excised, it appeared that certain conditions found in other cases did not exist; namely, the external rotators had not been detached and the capsule was not notably enlarged; but the deep indentation in the head, which has been noted after some dislocations, was found, and the inner margin of the glenoid cavity had been broken off or worn away, and it was to this fact that Schüller attributed the recurrences. The joint also contained four loose bodies composed of bone and cartilage.

The same indentation of the head and loss of the inner margin of the glenoid fossa are described in great detail by Broca and Hartman,[7 Ma. 14] as observed in some cases of their own and in several specimens of the Musée Dupuytren. They also point out that in some cases the capsule, instead of being ruptured on the inner side, is torn away at its insertion at the edge of the glenoid fossa, remaining continuous with the periosteum, which is stripped off the neck of the scapula, and that this form of injury appears to belong to dislocations by direct violence. They think that the existence of a class of incomplete dislocations has been alleged, erroneously, upon the basis of such cases, in which, however, the dislocation is complete.

A. R. Brackett[59 Sept. 27] reports a case of dislocation of the shoulder at what is probably the earliest age on record,—2 years. It was caused by "the sudden lifting of the child by the extended arm," and was reduced, under chloroform, by manipulation "with the orthodox snap." The dislocation was "into the axilla."

A case of aneurism following dislocation of the shoulder is reported by C. E. Caldwell.$_{May\,3}^{53}$ The patient was a man 58 years old. He was first seen six weeks after the accident; the dislocation had been promptly reduced, but he had continued to suffer and had noticed an increasing swelling. The head of the humerus was in place and the movements of the joint normal; "there was a large, fluctuating swelling in the outer aspect of the shoulder, over the area covered by the deltoid muscles. An examination of the axillary space revealed no swelling; the pulsation of the axillary artery was readily appreciable. The radial pulse was full and regular. No elevation of temperature appreciable by the hand. The skin covering the swelling was tense and fluctuation was marked. There was some pain on deep pressure."

At a second visit (interval not stated) the swelling had increased and the fluctuation was more superficial, with "some tendency to 'pointing' of the supposed abscess at about the insertion of the deltoid." An incision was made and exit given to nearly a pint of dark clots and some uncoagulated blood; the cavity lay between the deltoid and the humerus. A gush of arterial blood followed; it was arrested by pressure with the thumbs in the wound, and the patient was taken to the hospital, where Dandridge enlarged the incision and sought in vain for the source of the hæmorrhage. The cavity was stuffed with iodoform gauze, and the patient made a complete recovery. The injured vessel was thought to be the anterior circumflex artery.

Cases of simultaneous dislocations of both shoulders are reported by Sir Joseph Lister,$_{Jan.\,4}^{2}$ in one patient by a fall, in another during an epileptic convulsion; by McGaut,$_{Jan.\,11}^{6}$ by a fall; by Milne,$_{Feb.\,22}^{6}$ by a fall; and by Stimson,$_{Sept.\,20}^{1}$ apparently by hyperabduction and elevation of the arms.

The last-mentioned case must be quoted, also, as an example of a rare condition that made one of the dislocations irreducible except by open arthrotomy and division of the tendon of the subscapularis. The patient was a large, muscular man, 53 years old, who "had fallen into the water from a row-boat in which he was standing. He had swum a few feet to a neighboring tug, into which he was lifted by his extended arms. He immediately felt severe pain in the shoulders and arms, and was brought to the Chambers Street Hospital. It was there found that he had a

dislocation of each shoulder. On the right side it was well marked, the head of the humerus lying below and a little to the inner side of the coracoid process. On the left side the head of the humerus lay farther inward, the case being one of well-marked intra-coracoid dislocation. The dislocation on the right side was reduced without much difficulty under ether. All efforts to reduce the one on the left side failed. The condition of things was explained to the patient, and an operation was performed on the following day. On exposing the joint-cavity by an anterior incision, the condition of things at once became clear. The head of the humerus lay well to the inner side, and its neck was crossed on its outer side and above by the untorn tendon of the subscapularis muscle. After division of this tendon the head of the bone was easily returned to its place. The patient had made an uneventful recovery, so far as the wound was concerned. There was now a decided droop of the head of the right humerus, with paralysis of the deltoid. On the left side the arm was quite powerless and considerably swollen. The speaker did not think that this swelling had arisen from any interference with the vein, but thought that it was probably due to interference with the lymphatic return or to some damage of the nerve-supply of the limb."

The disability was subsequently recovered from, in great part, and both arms became useful.

Treatment of Old, Unreduced Dislocation of the Shoulder.—Sir Joseph Lister,[2] treated his 2 cases before mentioned by operation, 4 operations in all; in 3 he reduced after dividing all the muscles and soft parts attached to the upper end of the humerus, and in 1 he divided the tendon of the subscapularis and chiseled away the head of the humerus along the anatomical neck. In the first patient, nine and a half weeks had elapsed since the receipt of the injuries (subcoracoid dislocation of each shoulder); the patient was in a very helpless condition, and occasionally experienced numbness and venous congestion in the hands and arms. "Having made an incision from the coracoid process downward and outward, in the interval between the deltoid and the pectoralis major, I divided the tendon of the subscapularis muscle at its insertion, and then with a periosteum-detacher separated the soft parts from the head of the bone and the inner part of its neck.

This having been done so as to make sure that the vessels were entirely detached from the bone, I applied the pulleys in a manner which I need not describe in detail. As the pulleys dragged on the humerus, some fibrous bands were felt to be put on the stretch, and these were divided. The head of the bone still refusing to return to its normal position, the bone was more completely cleared and the pulleys were again applied. This failing, the head of the bone was protruded through the wound as if for its resection, the external rotators being cut through at their insertions; after which the pulleys were again employed, the direction of the traction being altered from time to time. The pulleys were then suddenly relaxed by pulling on a slip-knot arranged for the purpose, and at the same moment rotation outward and adduction of the limb were performed. The head of the humerus was then brought nearer to the glenoid cavity; it went still nearer in a second attempt of the same description, and at a third the head of the bone slipped into its normal place."

A week later he operated on the other shoulder in the same manner, except that he "at once protruded the head of the bone, dividing the attachments of all the rotators. At the second attempt the pulleys drew the bone into its proper position." The wounds healed without suppuration, and five months after the operation the patient could raise the arms to a right angle with only slight movement of the scapula. Two years later, when shown, "he exhibited all the natural movements of the arms in their normal degree except elevation of the limb, which he could not do far above the horizontal level. He could do any hard agricultural work as well as ever."

His second patient was a man, 23 years old, who had dislocated both shoulders (subcoracoid) in an epileptic convulsion seven months previously; marked atrophy of the muscles, especially of the external rotators; great disability. The head of the left humerus was restored to its place by operation, as in the preceding case; the usefulness of the limb improved so much under passive motion, massage, and galvanism that he returned six months later and asked that the right shoulder should also be operated upon.

"But six months more had elapsed after the first operation, and the result of that procedure, although distinctly successful, had not hitherto been by any means brilliant, and I decided that in

this case, instead of detaching the soft parts from the end of the humerus, and attempting reduction, I would merely cut down upon the head of the bone and remove it piecemeal by chisel and hammer, without disturbance of the attachments of the external rotators; for a study of the skeleton with the humerus in the subcoracoid position had shown me that the removal of the articular portion, without interfering with the tuberosities, would allow the bone to drop back into relation with the glenoid cavity. This was done on January 27, 1888, and the immediate result entirely answered my expectations. The bone went readily into its place, as I anticipated, and, the wound following the usual aseptic course, the recovery of movement was much more rapid than it had been on the other side; and on March 22d he was in a condition to leave the hospital. I afterward had reason to regret that I had not followed the same course on the right side as on the left. On June 12, 1888, both arms were continuing to improve in strength, but the left was now considerably stronger than the right, and its movements more perfect. He could put both hands behind his back; but with the left he could touch the angle of the other scapula, whereas with the right he could only reach as high as the top of the sacrum." A year later, it was reported that "he had nearly regained full use of his arms and shoulders, the only difference being that he could not raise them in a horizontal position above the shoulders." He was earning his living by hard, manual labor on a farm.

In conclusion, Lister advises "that when the surgeon feels in doubt as to whether it is prudent to make attempts at reduction, or when such attempts do not succeed, he should, in the first place, cut down upon the bone by the usual incision from the coracoid process downward and a little outward, and then, with a curved periosteum-detacher, freely separate the soft parts from the inner side of the upper end of the humerus," and then attempt to reduce. "But if this fails, then these instances show that you may proceed to turn out the head of the bone, detaching the insertions of the rotator muscles, and then, in all probability, you will be able to effect reduction, and, after reduction, you will have a thoroughly useful limb. Should even this procedure fail, removal of the head of the bone remains open to us, with promise of a good, though inferior, result."

Kocher[301, v.20, p.422] pleads in favor of the use of his method in the reduction of old dislocations of the shoulder (he has had 25 successes in 28 cases) and rejects operative interference, except in thoroughly exceptional cases.

Beach[99, Jan.9] reports 5 cases successfully reduced after periods of from six weeks to three months, and Cabot[99, Sept.11] 2, reduced by Kocher's method after two and three months.

Knapp[1020] has collected a number of cases of the treatment of old dislocations by various operative methods, and concludes that reduction by open arthrotomy should be restricted to recent irreducible cases, and that excision of the head of the humerus should be resorted to in old ones.

Reviewing these facts and opinions, it would seem prudent to attempt reduction by Kocher's method in cases of not more than two or three months' standing. This failing, or in older cases, and when the necessity of an improvement in the patient's condition is urgent, because of pain, disability, or personal consideration, to attempt reduction by arthrotomy, if the surgeon is sure of his asepsis; otherwise to excise the head of the humerus.

Congenital Dislocation of the Shoulder.—Chas. L. Scudder[51, Apr.] has made a valuable contribution to our knowledge of this rare condition in the report of 2 well-observed cases and the accompanying comments. His patients were brother and sister, the second and third children of a family of four.

Elbow.—Heinlein[336, Feb.1] reports 2 cases of complete outward dislocation of both bones of the forearm, with an autopsy in 1 case.

Isolated Dislocation of the Upper End of the Ulna Inward.—Loison[243, Sept.] reports a case of this heretofore undescribed lesion. The patient was a man 24 years old, and the injury was caused by a fall. The nature of the accident was not recognized until a month later, when the swelling had subsided. The results of the examination then made are given in detail, and show that the upper end of the ulna was displaced so far that the tip of the olecranon lay just below and behind the internal epicondyle, and the inner border of the olecranon lay almost in the same vertical plane with the top of the latter. The head of the radius was in place, and no evidence of fracture was found. Reduction was not made. Passive motion and massage gave flexion to 80° and extension to 135°,

Experimenting upon the cadaver, Loison found that after cutting off with a chisel a fragment of bone from the ulna, comprising the lesser sigmoid cavity and the attachments of the orbicular ligament, he could then produce this dislocation by radial flexion and torsion of the forearm.

Hip.—Perkins[99 Oct.16] reports a case of *compound dislocation* successfully treated in the Children's Hospital, Boston, under the care of Langmaid and Cabot. The patient was a girl 8 years old, and the injury was caused by the passage of the wheel of a heavy wagon across the back of the left thigh. A gaping wound 8 inches long extended from a point an inch above and inside the anterior superior spine of the left ilium diagonally across Poupart's ligament to the inner and posterior aspect of the thigh. The head of the femur, with the whole of the round ligament, presented in the wound near the middle of and close to Poupart's ligament. Reduction was easily made by flexion and direct pressure. Suppuration of the wound, with high fever, delirium, and bed-sores followed, but the patient survived, and at the end of three months could walk without crutches. There was complete ankylosis, the limb being slightly abducted and rotated outward, and flexed 15°.

Old Dislocations of the Hip.—A considerable number of cases of the treatment of old dislocations of the hip have been reported. Of these the most interesting and exceptional are 2 in which Chas. T. Parkes[779 Nov.] succeeded in effecting reduction after free division of the soft parts, the dislocation having existed for a year in 1 case and five months in the other; in each the dislocation was dorsal. The operation consisted in a long incision behind the trochanter, detachment of the muscles from the latter, exposure of the acetabulum, and prying the head of the bone into place. In the second case a transverse incision, 4 inches long, running forward from the middle of the first was needed to expose the parts satisfactorily.

Of the other cases, 4 were treated by excision of the head of the femur (Bloch,[336 Feb.15] Chiene,[36 Oct.] Nélaton,[96 Mar.] and Mayo Robson[6 July 28]) and 1 by excision below the trochanter (Paci[762 v.7,p.91]). In 4 the dislocation was dorsal; in 1 (Paci) everted dorsal, and had existed for periods ranging from four to thirteen months. All recovered from the operation, and the functional result was good in all, except,

perhaps, Nélaton's. In most of them an attempt to reduce was made after exposure of the head.

Kirn[761 V.4] has made a study of the subject on the basis of 19 collected cases; in 12 of them resection was done, with 3 deaths and 9 favorable results.

Congenital Dislocations of the Hip.—Verneuil[853 Jan.] discusses at length the origin of so-called congenital dislocations of the hip, and restates his theory that most of them are due to infantile paralysis. He gives the history of a case of which his explanation is unquestionably correct, but which differs utterly from the usual congenital dislocation seen so frequently in young girls.

DISEASES AND INJURIES OF ARTERIES AND VEINS.

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Very little has been published within the last year in the way of general treatment of this subject, although some of the articles which will be referred to are somewhat wide in their scope.

ARTERIAL SYSTEM.

Osler[764] reports a case of multiple thrombi, without disease of heart or arteries; an axillary artery and both femorals were involved. The patient was a man 50 years of age, who had been a moderately hard drinker. Osler thinks that such cases can only be explained upon the supposition of a peculiar condition of the blood, possibly due to toxic agents.

Sphacelus of the arm from embolism, ensuing in the course of articular rheumatism, and demanding amputation, is reported by Gangolphe[211] in the case of a robust man aged 35. It is noticed that previous to the appearance of a line of demarcation the temperature was constantly 104° F. (40° C.) or higher; but then immediately fell to normal. This was ascribed by Lépine to the absorption of toxic ammoniacal matters.

A case in which a blow over the femoral ring gave rise to arteritis, with atrophy and paralysis of the entire limb, is described by Starkey.[760] There was probably embolism at the division of the popliteal artery.

A case of partial rupture of the right subclavian artery, with extensive separation of the internal and middle coats, has been observed by Bowlby.[2] The patient, an old woman, had been run over; there was fracture of the clavicle as well as of the first and second ribs; the right upper extremity was cold and pulseless. Death took place next day, and an autopsy showed that at the junction of the first and second portions of the artery the internal and middle coats had been cleanly divided across; in the cardiac

part they had not retracted; but on the distal side they had been stripped away and invaginated into the third portion, completely closing its lumen.

A case is recorded by Markuse[34 July 29] in which a very large wound at the inner side of the right thigh was followed by almost fatal bleeding. The distal end of the artery was readily found and a double ligature applied; the cardiac end was sought for in vain. Under a careful antiseptic dressing healing took place well, and there was no further trouble, the patient being discharged at the end of the seventh week.

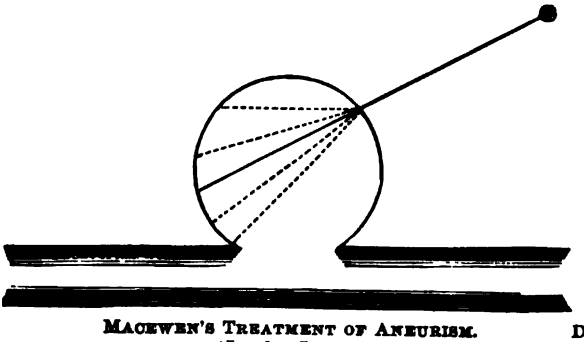
MacCormick[267 Mar. 5] reports a case in which there would seem to have been clearly an aneurismal diathesis; there was no history of syphilis. The patient, a man aged 48, had a left popliteal aneurism of three months' date; cardiac murmurs were present, and the area of heart-dullness was markedly increased. Rupture of the aneurism having occurred, the tumor was cut down upon and the vessel tied above and below. A large amount of clot was washed away and a drainage-tube was introduced. Healing went on well, but two months afterward a right popliteal aneurism was casually detected and the vessel ligated in Scarpa's space. Five months later he was re-admitted and a ligature applied in Hunter's canal, low down, with success; but four months after that symptoms of angina pectoris were manifest.

Treatment of Aneurism in General.—An interesting discussion is recorded[2 Nov. 15] as having taken place in the Surgical Section of the British Medical Association on the surgery of the large arterial trunks. The points taken up were: the material and form of ligatures to be used; the effect to be aimed at upon the vessel-wall; the propriety or advantage of using two ligatures, with division of the vessel between them; the re-introduction of the method of Anel in cases of popliteal aneurism; and the causes and treatment of secondary hæmorrhage after ligature.

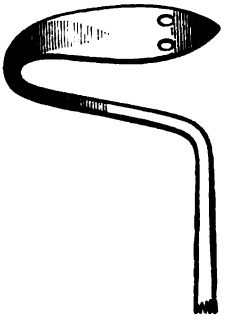
In a clinical lecture by Heath[6 Feb. 1] the various methods of treating aneurisms are instructively discussed.

The treatment of aneurisms, by inducing the formation of white thrombi within the sac, has been again advocated by Macewen.[6 Nov. 22] The advantage of white thrombi over the red is in the less marked tendency of the former to shrink in volume, or to undergo penetration by leucocytes or yellow softening. The

object is to obtain an adhesion of leucocytes to the vessel-wall, and to promote successive accretions of these bodies (a parietal thrombus) until complete occlusion occurs. For this purpose Macewen employs a slender pin of sufficient length to transfix the aneurism and to permit manipulation, in order to scratch the inner surface of the opposite wall at various points over its entire extent. Sometimes this can be accomplished by one insertion, but it may be necessary to thrust the pin in at several points. Antiseptic precautions are, of course, to be observed. The length of time during which the pin is to be kept in place varies, but should never exceed forty-eight hours, and may be much less. In the case of a very large aneurism several pins may be introduced at various points, but they should not be too close together. Clinical experiences in favor of this method are adduced: 2 cases of aortic



MACEWEN'S TREATMENT OF ANEURISM.
(*London Lancet.*)



DEMMER'S ANEURYSMANADEL.
(*Cent. für Chirurgie.*)

aneurism, 1 thoracic and the other abdominal; 1 of the femoral artery, involving the external iliac; and 1 of the left subclavian. Macewen regards the idea that every aneurism contains within itself a potential cure as the essential matter, whatever may be the method devised for inducing its action.

Demmer [336] proposes a slight modification of the Deschamps artery-needle (known in England and America as Cooper's) to facilitate the application of a double ligature. The end is widened and has two eyes instead of one; the thread is passed through both, and after the needle is inserted under the artery the loop is caught with hook or forceps and the needle withdrawn.

Aorta.—An important case of dissecting aneurism of the thoracic aorta is detailed by Ewald. [41] A man, aged 56, somewhat cachectic, suffered from oppression in the chest, dyspepsia,

and gastric pains. There was slight bronchitis; the heart-sounds were clear, and the area of dullness on percussion not increased. An epigastric swelling was suspected to be a carcinoma of the stomach, and, to test this, he was given a preparatory meal, after which a soft-rubber tube was passed without difficulty. As this was done, the patient fell, became blanched, and died. No blood came up with the tube. The assistant then stated that he had just at last noted an increase of area of cardiac dullness and a slight blowing sound. An autopsy showed the pericardium greatly distended with blood, partly fluid and partly coagulated. After much search, at the upper part of the ascending aorta there were found three small tears, like knife-cuts, leading into a space between the adventitia and the media, which led down to a very small orifice in the pericardium. There was a small, healed ulcer in the stomach. The epigastric tumor proved to be the head of the pancreas. Another by Jacobi, $\frac{41}{\text{Sept.1}}$ a girl 5 years old, of tuberculous parentage, who had had the head of the right femur excised for morbus coxæ, was seized three months later with colicky pains in the left epigastrium, where a swelling was perceptible on deep palpation. Five days later death ensued, having been preceded for forty hours by several general convulsions. An autopsy showed general tuberculosis of the abdominal organs, in addition to which there was an aortic aneurism. This seemed to have been due to invasion of the wall of the vessel by the tubercle bacilli. Jacobi believes aneurism in children to be independent of changes in blood-pressure, but always caused by morbid processes in the vessel-walls.

Burgess $\frac{2}{\text{Nov.15}}$ reports a case of aneurism of the abdominal aorta in a man aged 50, with a history of syphilis and intemperance. Some benefit had been derived from iodide of potassium. The tumor burst into the anterior mediastinum. The cœliac axis and superior mesenteric artery came off from the dilated portion, the renal arteries just below it. The bodies of three vertebræ were laid bare.

Buscarlet $\frac{7}{\text{May 1}}$ reports a case in which a man aged 46, with atheromatous degeneration of his arteries, carried an aneurism of the abdominal aorta, with obscure symptoms, for two years; he then had a severe fall down a staircase, fractured three ribs, and was temporarily paraplegic. About three months later the wall of the sac gave way and a false aneurism was developed, which

grew very large and at the end of three months ruptured, causing instant death.

In another instance, reported by Joslen,[2] a man aged 34 had had aneurism of the abdominal aorta six years; rupture of the sac took place, but he survived twenty-six days, dying then of exhaustion.

A case is related by Litten,[4] in which the diagnosis presented some peculiar difficulties. A case of enormous sacculated aneurism of the abdominal aorta, in a woman aged 38, is recorded by Espey.[53] Death occurred, it would seem, from exhaustion by suffering. An autopsy showed the sac extensively adherent everywhere, and filled with organized fibrin. Several of the ribs on the right side were entirely gone posteriorly.

OTHER ARTERIES OF THE TRUNK.

Welch[764] reports a case of miliary aneurism of a branch of the gastric artery, which ruptured into the stomach with fatal hæmatemesis. The patient was a man about 50 years of age, whose clinical history was very indefinite. The cause of the lesion was found in arteritis obliterans, which affected a very large area of the arterial system within the trunk. The aneurism was about the size of a split pea, and was only detected with great difficulty at the seat of a perforation of the mucosa in the posterior wall of the stomach.

A case supposed to be one of embolism of the superior mesenteric artery has been reported by Anderson.[218] The patient, a boy aged 12, had rheumatic fever five years previously; he had now intense abdominal pain, nausea, dyspnœa, and at times bloody stools; the feet and legs have been occasionally swollen. The correctness of the diagnosis was questioned by Finlayson.

In a case reported by Spencer,[6] a man aged 58 had sustained a fracture dislocation of the spine in the dorso-lumbar region, about eighteen months previously, in consequence of which there was angular projection of the eleventh and twelfth dorsal and first lumbar spines, and on either side a pulsating swelling, gradually increasing. By exclusion Spencer had judged that these swellings were aneurismal in character, and that the vessels involved were the lumbar arteries. In the discussion of the case by the Clinical Society of London, various members expressed widely

different views, hæmatoma, abscess, and aortic aneurism being suggested as possible explanations of the symptoms presented. The case did not seem to be one admitting of effective treatment.

Head and Neck.—Mynter[96 Feb.] reports a case of extensive cirsoid aneurism of the scalp, cured by multiple ligatures, in a woman aged 43. It seemed to have been caused by a blow eight years previously. The right external carotid was first tied, then the left temporal and eleven other arteries. Two weeks later three enlarged but not pulsating arteries in front of the right ear were tied.

A curious case of cirsoid aneurism at the occipital protuberance in a boy aged 5 has been observed by Karewski.[4 Sept. 15] No apparent artery could be detected; the skull was scoliotic; there were evidences of intra-cranial pressure, with slight œdema of the papilla, more marked in the right eye than in the left. The external tumor seemed to communicate with the sinuses at or near the torcular Herophili. Nothing is said as to any proposed treatment.

A case of traumatic aneurism of the internal maxillary artery is recorded by Krauss.[1 Aug. 2] The patient, a man 34 years old, fell 16 feet, striking on the left side of his head. A bruit, perceptible to the patient as a hissing sound, and heard on applying the stethoscope over the left temporal region, was the principal symptom; pressure over the external carotid artery caused it to disappear. A spring truss, having a pad at each end, was fitted to the head, one pad resting in the left temporal fossa; this was applied every night for ten weeks, when the cure seemed complete.

A case of aneurism of the posterior auricular artery, arising from a blow with a whip, is reported by McDonnell.[22 July 16] A cure was effected by constant pressure for four days.

A case of spontaneous aneurism of the left internal carotid, in a young and robust woman, is reported by Clementi.[84 Mar. 15] She had first perceived it a year previously; it was growing steadily, and projected into the fauces as well as outwardly. Pressure was tried, but provoked intense pain in the side of the head. A double catgut ligature was therefore placed upon the common carotid at about the middle of its course, and a good recovery ensued, although for twelve days after the operation there was occasional severe pain, with some confusion of ideas.

In connection with this case, Virdia mentioned 3 cases treated by Ambrosio: 1 at the bifurcation of the carotid, 1 of the trunk itself (both traumatic), and 1 from a tumor involving the bifurcation, rupture of the vessel ensuing. In the 2 former cases the common carotid was tied; no cerebral symptoms followed, but both patients died of pyæmia from suppuration of the sac. In the third case ligatures were placed upon the common internal and external carotids, as well as upon the superior thyroid; the patient lived twenty days without cerebral disturbance, but died apparently from cerebral anæmia.

A specimen of false aneurism of the inferior thyroid artery, a very rare lesion, due, seemingly, to hyperplasia and calcareous degeneration of the left lobe of the thyroid body, has been shown by Brousses [211 July 6] to the Société des Sciences Médicales de Lyon. The diagnosis presented much difficulty.

An important case treated by Wölfler is reported by Frey. [8 Nov. 20] A man aged 26 received a knife-wound in the right side of the neck; seven days later a traumatic aneurism of the common carotid appeared, and increased steadily. Five days afterward the ligation of the vessel was performed; great difficulty was experienced in controlling the bleeding, which was only effected after division of the sterno-cleido-mastoid tendon, by catching the artery in forceps, isolating it, and then tying. Another ligature was applied above, and 2 centimetres of the vessel, including the wound, excised. The patient, though almost exsanguine, did well; but he suffered from paralysis of the left vocal cord and thyro-epiglottideus muscle, from lesion of the inferior laryngeal nerve; there was also ptosis and contraction of the pupil of the left eye, with redness and sweating of the left half of the face, from damage to the cervical portion of the sympathetic nerve.

A case of spontaneous cure of a sacculated aneurism of the common carotid is reported by St. John [186 June]; rupture had taken place, and pressure had been made with cotton saturated with a solution of persulphate of iron until ligation of the vessel could be performed. All was in readiness, "a few days" later, for the operation, when it was found that the cure was complete.

Paul [187 Jan.] records a case of aneurism at the root of the neck, on the right side, in which he ligatured the subclavian and common carotid arteries; as this did not check pulsation, the tumor was

punctured with a small trocar and canula, and about 2 yards of thick, carbolized catgut passed into it. Death occurring six days later, it was found that the arch of the aorta was dilated and atheromatous, giving off a large, sacculated aneurism which extended up the innominate artery. A good deal of non-adherent clot existed within the sac.

A fatal case of innominate aneurism, in which, during life, the symptoms had been in great degree masked by pulmonary complications, is reported by Edgerly.[779 Aug.]

We note also a case reported by Cohen,[69 Mar. 6] in which a cirsoid aneurism, arising from a tooth-abscess, in a boy of 17, occupied the right cheek and the neck down to the clavicle, as well as the left cheek and submaxillary region.

Cases of ligation of the common carotid for aneurism are reported by Lloyd[2 Mar. 20] and Rose.[6 Nov. 20, '99] Mention may be made also of an interesting discussion on the treatment of aneurisms of the internal carotid.[188 May 18]

Upper Extremity.—Högerstedt,[21 June 22] gives an account of a case of occlusion of the subclavian artery at its origin. It occurred in a woman, aged 48, the subject of acute articular rheumatism eleven years previously.

An interesting case of traumatic aneurism of the first part of the right subclavian artery, from fracture of the clavicle, is reported by Twynam.[6 June 21] The patient was a girl, who was thrown from a horse against a stump; the swelling was not detected until five days afterward. Spencer's operation (in the median line) was done thirty-one days after the accident, the tumor being very large. By inadvertence, a ligature was placed on the innominate, supposed to be the carotid, which vessel was later found and tied. Death, preceded by coma, left facial paralysis, and total paralysis of the right side of the chest, took place eighteen hours after the operation. The fatal result seemed to be partly attributable to pressure upon the phrenic nerve; it was suspected that there was cerebral embolism also, but the autopsy was confined to the seat of injury. An unusual arrangement of the branches given off made the establishment of collateral circulation very ready, so that faint pulsation was felt in the right radial the evening of the day of operation.

In a case at Czerny's clinic, reported by Schmidt,[57 Dec. 22, '99] an aneurism of the left subclavian artery was subjected to electro-puncture

thirty-two times; finally, necrosis occurred in the tissue about one of the points of insertion, and consequently there was a perforation of the sac; the vessel was ligatured. partial resection of the clavicle and upper two ribs and temporary resection of the manubrium sterni being necessary in order to so doing. The patient died next day of inflammation of the left pleura.

A successful ligation of the subclavian artery in its third part, for axillary aneurism, is reported by Kammerer.[150 Oct.] The use of the arm was regained. A similar case (traumatic) is reported by Wilson.[9 June 21]

Ligation of the left subclavian artery in its third part, for false aneurism due to gunshot injury, is reported by Parke.[59 Feb. 1] A good recovery followed, but with almost total loss of sensation in the thumb, index, and middle finger. The patient, a man aged 40, first noticed the swelling three weeks after he was shot, and the operation was done three days later. The ball was extracted from the neck subsequently.

A case in which a gangrenous mass, the remains of a subclavian aneurism, came away, the patient recovering, is recorded by Oliver.[6 Oct. 16] Iodide of potassium, and locally galvano-puncture, had been employed previously, with the result of solidifying the tumor. The slough was as large as a child's head, and weighed 20 ounces (622 grammes).

A case in which an arterio-venous aneurism of the axilla was successfully extirpated is reported by Reclus.[3 May 28] The patient, a man 44 years old, had sustained a lance-wound in this region twenty years previously, but had had no trouble from it, after the six months required for its healing, for nineteen years. The small tumor was exposed, and as the artery and vein were closely united, both were included in one ligature above and in another below, instead of being tied separately above and below, as had been intended by the operator. All the vessels connected with the sac were carefully tied and divided, and the tumor was removed without difficulty; the subsequent course of the case, up to the time of the report, was favorable.

Köhler[4 Dec. 9, '69] records an interesting case in which a large axillary aneurism was developed in consequence of the presence of an echinococcus-cyst in the wall of the artery. The patient, a man 25 years of age, while at work was seized with double vision, and

had formication in all his limbs. On admission to hospital, pulsation was absent in the left brachial artery and in both radials; both forearms were reduced in sensitiveness, the left being also cooler. Some days later both hands and the right foot were mottled, and the tips of the left forefinger and little finger were sphacelated. Sharp pains were felt in the left arm, and somewhat in the right also. On the thirty-third day a small aneurism of the left axillary artery was detected, which, within a week, attained the size of a fist. Operation was now deemed necessary. A ligature was first placed upon the subclavian, the slight pulsation in which was very notable. The brachial was next tied just below the tumor; it was plugged with brown clots, and the tissues around it were callous and brawny. In trying to free it for the purpose of extirpation, the under part of the sac was found to be imbedded in fibrous tissue, the median nerve was stretched and flattened over the sac, which was ruptured as it was dissected out, and there was no trace of clots within it. The patient did well. At one changing of the dressings, an echinococcus-sac, as large as a walnut, was found in the sac adhering to the tampon.

Köhler gives an explanation of the way in which the embryo of the tænia, lodging in the wall of the artery, grows, surrounds itself with a fibrous capsule, wears away the intima, and finally bursts into the lumen of the vessel; it was from the time of this occurrence that the rapid growth of the tumor above noted took place, as the wall of the cavity had then very little power to resist the blood-current.

Two cases of traumatic arterio-venous aneurism of the axilla, treated by direct compression of the tumor, combined with compression of the artery, are reported by Geschwind.[243] The subjects were soldiers, aged respectively 25 and 35 years, and in each instance the wound was from a knife. The method used was the application of an accurately-molded plaster bandage, with apertures through which pads could be placed at the points desired; these pads were solid, but the pressure upon them was made uniform by the insertion of elastic caoutchouc between them and the retentive bandages, and manual pressure was occasionally made. In one of the cases a cure was effected after three days; in the other, the patient became intractable and insisted upon his discharge from the hospital before the treatment had been fairly carried out.

In a case related by Cowell, [6 Nov. 15] a man, aged 53, who presented himself for treatment of a right axillary aneurism, had probably had like disease, spontaneously cured, on the other side. Digital compression over the subclavian artery failing, a ligature was applied with success. Seventeen months later, a secondary aneurism on the cardiac side of the ligature was noted; it admitted of medical treatment only. Sixteen months afterward, he was found to have complete left hemiplegia; both aneurisms were firmly consolidated. This condition passed off, but was succeeded in about eighteen months by symptoms of mental failure, apparently from advancing disease of the arteries of the brain.

Bardeleben [4 Dec. 16, '89] has reported a case of axillary aneurism of small size, caused by the pressure of a crutch, and cured by extirpation after ligation of the axillary above and below, as well as of the subscapularis and anterior and posterior circumflex; the vein had become adherent to the artery, and a portion of its wall was removed.

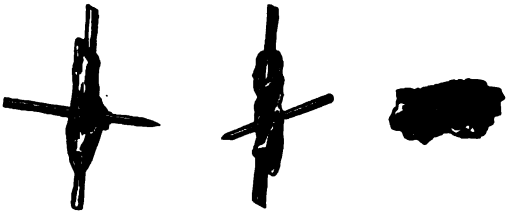
An arterio-venous aneurism of the arm from shot-wound has been reported by Menocal. [13 May 15] A cure was effected by ligation of median and basilic veins, and of the artery above and below, as well as of the three vessels going to the sac. Another has been observed by Kammerer. [1 May 10] A false aneurism of the brachial artery, with wound of the median nerve, is reported [113 Aug. 11, '89] as having been successfully treated by the method of extirpation. The nerve recovered its function. A case of traumatic aneurism of the ulnar artery, cured by ligating above and below, and emptying the sac, is reported by Parker. [12 Dec., '89] A case of *secundum artem* ligation of the ulnar artery at its upper part is reported by Borntraeger. [336 Jan. 11] The operation was demanded for the arrest of bleeding from a stab-wound penetrating the vessel, and was attended with no special difficulty. Renzi [592 May] reports 2 cases of shot-wound of the forearm, attended with such hæmorrhage from arteries involved as to call for ligation of the brachial; also a stab-wound of the calf, causing a very large false aneurism, for which ligation of the popliteal was performed, the cavity being then opened up, evacuated, and the vessel tied below.

A curious case is recorded by Frey, [8 Nov. 20] in which a bit of steel struck a machinist in the bend of the elbow and pierced the ulnar vein and artery; copious bleeding ensued. The wound was en-

larged and both vessels tied above and below, the intermediate portions being excised. It was found that the foreign body had torn through the anterior and posterior wall of each vessel, leaving in each two lateral bridges of tissue undivided.

Mention may be made here of a case of phlebarteriectasis of the arm and hand, reported by Weiss[150 May]; also a cirsoid aneurism of the hand, beginning in one finger and spreading upward so as to demand amputation of the arm, by Hoffmann[69 Mar. 4]; also a case of embolism of the radial artery, reported by Mills.[242 Apr.]

Lower Extremity.—A case of embolic aneurism of the right gluteal artery, in a woman aged 25, the subject of ulcerative endocarditis, has been reported by Willett.[6 Feb. 22] Two cases of ilio-femoral aneurism are described by Purnell,[849 Dec., '99] in which spontaneous cure occurred. An interesting case is contributed by von Büngner,[13 No. 1] in which a boy 17 years old had rheumatic endocarditis;



RUPTURE OF ARTERY AND VEIN.
(*Wiener klinische Wochenschrift.*)

there had been three attacks of articular rheumatism, one at 8 years, one at 13, and one at 17. Severe pain and a small swelling at the upper and inner part of the left thigh marked the beginning of a mycotic embolism, inducing aneurism. On account of rupture of this the external iliac artery was tied; ligatures were also applied to both the superficial and the deep femoral, and the diseased portions of these vessels were excised. Gangrene of the foot and of the last joints of the fingers of the right hand ensued, and death took place nearly three months after the operation. At the autopsy there was found mitral insufficiency, with vegetations, marked narrowing of all the larger arteries, and thrombosis of the right brachial and left external iliac. There were secondary changes in the lungs, kidneys, and spleen. In a case of aneurism of the superficial femoral artery in Scarpa's triangle, Lawson[6 Aug. 9

employed weight-compression for four days, several hours daily, without success; a stout carbolized catgut ligature was then placed upon the external iliac artery, when pulsation ceased in the tumor, and the patient made a good recovery.

In connection with a report of a case of aneurism of the right femoral artery in the middle of the thigh, and, subsequently, of the left popliteal at its lower part, Marsh[6 Dec.22,'70] advocates the practice of applying two ligatures and dividing the vessel between them. The argument in favor of this method, on account of avoidance of tension and consequent greater safety, seems to be well founded. Marsh says that properly-prepared silk is the best material for the ligature, but afterward speaks very favorably of kangaroo tendon. A very unusual condition—double femoral aneurism—occurred in a case recorded by French.[786 Mar.] The patient was a colored man aged 40; the history of the case obscure. On the left side the tumor was small, and seated at the apex of Scarpa's triangle; on the right the whole space was occupied, and the limb was œdematous. A week after admission rupture of the latter aneurism occurred, with very threatening symptoms, and an operation was performed. Esmarch's bandage was applied, the tumor opened and emptied, and a silk ligature placed upon the common femoral just beneath Poupart's ligament. The sac was then dissected out. Some bleeding still going on, the epigastric was also tied and the wound was then closed. With the exception of some sloughing and suppuration at the lower part of the wound, healing went on well. Great care had to be taken to maintain the temperature of the limb. When the patient was dismissed there was some increase in the size of the aneurism on the left side. A case of traumatic aneurism of the femoral artery in a man aged 75 is recorded by Boeckel,[168 Dec.1,'70] in which, three weeks after the injury, suppuration occurred in the sac; ligation of the femoral as high up as possible was performed, and three weeks later the abscess was opened and evacuated. In about three months from the time of his accident the old man was able to return to work. A case of arterio-venous aneurism of the thigh, from shot-wound, in a man 28 years old, is reported by Roberts.[224 Dec.7,'70] About four and a half months after the injury an incision was made and the vessels were ligated separately above and below; two feeder vessels were also tied. As oozing of blood con-

tinued, a second ligature was applied around all the vessels with success. Bax [230 Dec.'99] reports a case of traumatic false aneurism of the femoral and profunda arteries, due to puncture with an awl, in a young man of 19; digital compression was tried for six hours, but caused intolerable pain; the tumor was therefore exposed by incision, the main vessel tied above, and the sac laid open and emptied; a ligature was applied below, but there was still some bleeding from the orifice of the profunda. This vessel was therefore tied above and below and the wound closed, with drainage. No trouble followed; the temperature of the limb was re-established in forty-eight hours. Healing took place perfectly, only four dressings being made. Frey [8 Nov.'90] records a case in which a man 44 years old received a kick at the inner side of the left thigh, causing a rupture of both artery and vein. The wound bled freely, but healed under treatment. A small tumor soon afterward appeared, and at the end of four years suddenly increased after he had worked very hard; it burst, and there was profuse (venous) bleeding. The overlying skin was gangrenous; the tumor showed no pulsation nor bruit. Conservative treatment was employed, but a fresh hæmorrhage, arterial in character, demanded operative interference. The vessels were exposed by an incision and tied above and below. At the posterior part of the femur there was an erosion, surrounded by osteophytic formations. Necrosis of the limb rapidly advanced, and on the second day the patient died from septic infection. It is clear that there was formed here a false aneurism by which the bone was worn away. Reviewing the case, Frey justly remarks that an amputation would probably have brought about a more favorable result.

FREY'S CASE OF INJURY TO VEIN AND ARTERY. (*Wiener klinische Wochenschrift.*)

Plasencia[792 Nov.11,'89] gives the history of an interesting case of osseous aneurism of the inner condyle of the right femur in a man 27 years of age. Abscess being suspected, an exploratory puncture was made, and subsequently amputation through the lower third of the thigh. The patient recovered. In a case reported by Ehrmann[168 Mar.1] a robust man aged 41 had a left popliteal aneurism, caused by a sudden strain, which was treated first by Reid's method, and subsequently by indirect pressure. The first two applications of this caused inflammation and fever, the temperature reaching 105° F. (40.55° C.). The third gave rise to no fever, nor did the fourth, made the following day; but in the night ensuing on the latter alarming symptoms of left pulmonary engorgement from embolism appeared and continued for thirty-six hours, after which they gradually subsided. The treatment was resumed, and after five more applications of the pressure, twenty-three hours in all, the tumor ceased to pulsate. But it was now found that the foot was totally paralyzed and without feeling. This condition gradually passed away as to the flexors, but in the extensors it seemed to be permanent, and the limb was noticeably atrophied. It does not clearly appear whether this sequel was due to the disease or to the treatment instituted for its relief. A case of popliteal aneurism is reported by Cowell,[6 Nov.15] in which, after the failure of digital compression, forced flexion, and the Esmarch bandage, the superficial femoral artery was tied with kangaroo tendon, and a perfect result obtained A case of successful extirpation of a traumatic popliteal aneurism is reported by Kimura.[200 June] Bax[230 Nov.,'89] relates a case similarly treated, and with like result; here, however, there was atheroma of the vessels.

An interesting account is given by Post[99 Dec.12,'89] of 4 cases of aneurism treated by the old method; 2 were traumatic diffuse aneurisms of the femoral low down, and 2 involved the popliteal artery. One of the latter was very unfavorable, gangrene of the leg being imminent when he came into the hospital. Excellent results were obtained in all. Ziembicki[560 No.30] records his experience in 2 cases of popliteal aneurism. In 1, compression having been previously tried, with the effect of increasing the size of the tumor, the femoral was ligated above Hunter's canal, and the tumor became softer, but not smaller. In the other case extirpation was resorted to, and although the operation was difficult, by reason of

the great development of the collateral vessels, a perfect result was obtained. Blumer [3 Mar. 22] reports the case of a laborer, aged 37, who had in the left popliteal space a firm, ill-defined swelling, in which, later, there was deep fluctuation, but no pulsation or thrill. On aspiration, only blood escaped. The little toe became gangrenous. The tumor was incised, the clots turned out, and the artery tied; its distal end could not be found. The cavity was plugged with oiled lint. A good recovery ensued. A very similar case is given by Jackson. [2 Mar. 22] Boeckel [168 Dec. 1, '90] records a case of popliteal aneurism of unknown origin in a man aged 56, in which, ligation of the femoral in Scarpa's space having been done without effect, a cure was obtained by cutting down upon the tumor and tying the artery above and below, leaving the sac unopened.

A case of popliteal aneurism, cured by digital pressure maintained for twenty-four hours, is recorded by Mussey. [53 Dec. 20] The patient was a negro man about 50 years old; during the treatment it was necessary to keep him under the influence of morphia. In a case of left popliteal aneurism, reported by Rivington, [6 May 8] a cure was effected by compression, kept up at various intervals and amounting in the aggregate to one hundred and eighty-four hours and twenty minutes, or over seven and a half days. During the third period of compression, lasting ten hours, a tourniquet was used; the rest of the time pressure was made with the fingers. The patient was a man aged 43, a hard drinker, and with marked evidences of disease of the heart and arteries. Another is given by Hector. [456 May 20] The patient, a man 36 years of age, had been cured of an aneurism in the other ham in 1885. In another, by Jones, [6 Apr. 19] pulsation recurred three times on the removal of the pressure, but ceased altogether after a fourth application of it. A case of popliteal aneurism in a sailor 33 years of age, cured by ligation of the superficial femoral artery in Scarpa's space, digital and instrumental pressure having been previously thoroughly tried without success, is reported by Stone. [2 Feb. 1] The ligature used was of kangaroo tendon; drainage was employed. Leyden [4 Apr. 7] reports a case in which thrombosis of the left popliteal artery followed upon a perityphlitic abscess. The patient, a woman, recovered with only the loss of the second toe and a portion of the big toe. A *résumé* of the instances previously recorded is given. In con-

nection with this case Henoch mentioned one in which a boy 8 years old, with severe diphtheria, had thrombosis of both iliac arteries; and Kounthal another in a girl 2 years old. Leyden also spoke of syphilitic thrombosis of the arteries, a condition which, although unfrequent, does occur; he gave an instance in point recently observed by him. A case of diffused popliteal aneurism, treated by amputation of the thigh with good result, is reported by Syme. [285 Dec.15,'99] The patient was a negro man aged 38, a hard drinker, but not syphilitic; the disease was of only three months' standing. An aneurism of the popliteal artery, associated with sarcoma, is recorded by Croft. [6 Feb.22] The patient was a man aged 71. Ligation of the femoral was twice performed, with the effect of checking pulsation, but the tumor increased and softened, and amputation was resorted to. The disease, however, returned, destroying life a year later. The question of the order of precedence, and of the relation between the aneurism and the malignant growth, seemed to be an open one. Anderson [2 Jan.4] records a case in which a woman aged 61 had had for a year a popliteal aneurism, which ruptured into the upper part of the calf; the artery was tied at the apex of Scarpa's triangle with two carbolized-silk ligatures and divided between them. Healing took place well, but the hæmatoma in the calf remained, and at the end of six weeks it was laid open, evacuating a mass of fluid blood and clots; this wound healed by granulation. A case detailed by Jones [6 Apr.19] is of much interest. A man aged 22 had a left popliteal aneurism cured by ligation of the superficial femoral. Three and a half years afterward similar disease occurred in the other ham, and the same treatment was adopted. A year later he had sudden, severe pain in the right ham, and a very slightly pulsating tumor was detected at the seat of the former trouble. Some seven months after this the tumor was laid open and some clots and fibrinous material turned out. Suppuration of the knee-joint followed, requiring incision and drainage, but eventually a good result was obtained. A case of diffuse aneurism of the calf, from slight strains, is reported by Battle, [22 Dec.18,'99] and in connection with this 4 other instances are cited, 3 of them traumatic. In Battle's case ligation and excision constituted the treatment; in 2 the course pursued is not stated; in 1 simple ligation was employed; and in 1 the popliteal artery and vein were tied above and below, and a

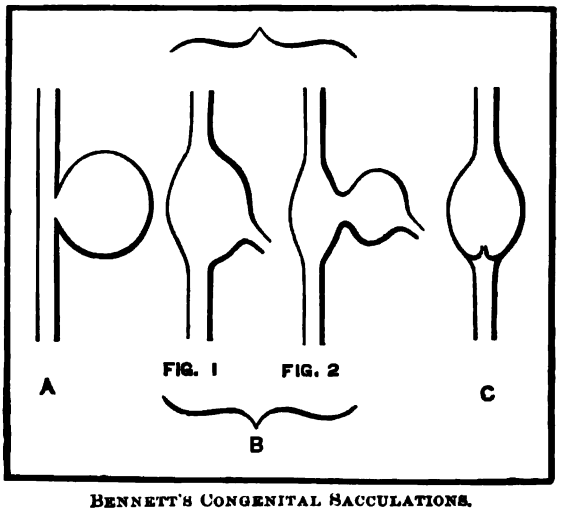
ligature was placed on the anterior tibial. Traumatic aneurism of an artery in the leg, the result of a fracture of the bones, and cured by compression of the common femoral, is described by Jones. [6 Apr.19]

Arrest of Hæmorrhage.—The temporary transfixion ligature, for the prevention or arrest of hæmorrhage, is enthusiastically advocated by Manley. [101 Dec.'89] He proposes that a curved needle armed with a silk thread should be thrust down through the skin, passed under the vessel, and brought out again as near the point of entrance as possible; the thread to be then tied around all the inclosed tissues tightly enough to arrest pulsation or bleeding. It is cut and removed after remaining in place from one to twenty-four hours. Four cases are cited—one of the femoral artery, one of the coronary arteries of the lips, one of the radial and ulnar, and one of the internal epigastric—in which this plan is said to have been successfully adopted. There would seem to be very great risks in this blind plunging of a needle through the parts,—risks unavoidable even in the most skillful hands, and beyond calculation in those of the awkward and inexperienced. I cannot but express the opinion that such a procedure is unsurgical, and that grave consequences would be apt to attend its indiscriminate use. According to Jassinowsky, [113 Feb.2] the suture of recent clean wounds of arteries, not involving more than half the circumference of the vessel, is easy, safe, and effective. The current is shut off by pressure, the artery exposed, the sutures introduced through the outer and middle coats, tied, and cut off short; the sheath, fasciæ, and overlying tissues are sewed separately. Burci [336 Nov.22] expresses himself as convinced of the value of the suture in longitudinal wounds of arteries. Experiments on dogs have led him to this view. The most absolute asepsis is essential; the material used is the finest silk, applied in a continuous suture, engaging only the outer and middle coats of the vessel.

VENOUS SYSTEM.

Congenital sacculations and cystic dilatations of veins have been discussed by Bennett. [6 Apr.12] Dilatations of the veins, or sacs connected with them, analogous to traumatic aneurisms, are sometimes caused by injury. The morbid conditions considered by Bennett are of three classes, which may be better understood by

aid of the annexed diagrams: 1. Congenital venous sacculation (Fig. A), usually attended with dilatation of other veins either near or remote. 2. Cystic dilatation at the point of entry of a tributary vein into the parent trunk, called also "junction dilatation" (Fig. B, 1 and 2), invariably associated with varicosity of other veins in the neighborhood. 3. Local dilatation involving at the affected point the whole circumference of a vein which may or may not be varicose in part or throughout (Fig. C). This may occur in any valved vein. Active treatment may be called for in case of rapid distension, causing pain and threatening hæmorrhage; rapid coagulation of the contained blood from injury, inflammation,



BENNETT'S CONGENITAL SACCULATIONS.
(*Lancet.*)

or other cause; or inflammation and suppuration in dilatations packed with clot. Total removal of the sac, with the neighboring portion of vein, should be effected. Much difficulty may attend the doing of this if the sac is not pedunculated, and if the vein is a large one. Double ligation and division may perhaps be done successfully in such a case.

A case of fatal hæmorrhage from rupture of the portal vein, from a fall backward of about 10 feet, is recorded.[231 July] The rent in the vein was smooth, about 4 millimetres long, and there were two smaller openings in the splenic vein just before its junction with the superior mesenteric. The man had been intemperate, but the abdominal viscera showed no abnormalities. A case of portal

obstruction, in which enormous varicose enlargement of the superficial abdominal veins would seem to have relieved the portal system, preventing ascites and saving the patient's life, is reported by Suckling.[645 Mar. 9] The man was 47 years old; had been a soldier in India and a hard drinker; had had venereal disease, two attacks of jaundice, and, probably, dysentery. The swelling began about six years ago in the epigastrium. Two years later he noticed the veins running down to the groin. Over the large mass of veins there was a loud venous hum, but no pulsation could be perceived in it. The subject of thromboses of the mesenteric veins has been discussed by Pilliet.[73 June 21] This condition seems to obtain mainly in late middle life or in advanced age. It comes on suddenly with obscure symptoms of abdominal disturbance, pain, nausea and vomiting, and tympany, and, so far as it has yet been observed, is rapidly fatal, the mucous membrane of the loops of intestine involved becoming sphacelated. The diagnosis of this affection from intestinal obstruction, from acute poisoning, or from non-febrile peritonitis, may be very difficult; nor can any treatment, even if time allowed of its being instituted, offer much prospect of success.

VARICOSITY OF ABDOMINAL VEINS.
(*Illustrated Medical News.*)

A case of thrombosis of the portal vein, with suppurative inflammation, is reported by Aczél.[84 Apr. 5] The patient was a man aged 28, who had been under treatment for catarrhal jaundice, and was relieved, but came back with fever of an intermittent character and died. There was found at the autopsy general adhesion of the liver to the surrounding organs, and the portal vein and its branches filled with thrombus breaking down into pus; the walls of the vessel were thickened and lined with inflammatory deposit. The same condition obtained in the upper hæmorrhoidal vein; the whole alimentary canal showed traces of chronic

catarrh. This seemed to have been the primary lesion, involving the hæmorrhoidal vein, and this by metastasis affecting the portal vein and the liver. Some biliary calculi, which were present in the gall-bladder and hepatic ducts, were thought to have caused the icterus, but to have had nothing to do with the suppuration. A case diagnosed as one of obstruction of the right iliac vein is reported by Shiels.[77 June] The patient was a man aged 55, who, after exposure to very severe cold, had swelling and pain involving the foot and extending up to the hip. Pulsation was felt in all the arteries. The skin was white and shining, and pitted on pressure. Some varicose veins were observed in the leg. Dover's powder, with artificial heat and elevation of the limb, relieved the pain; the man was then put on large doses of the syrup of iodide of iron, and later compression, by a Martin elastic bandage, was made. At the time of report the limb was of normal size, but its use had not yet been resumed.

Wyeth,[101 Sept.] in a case of obstinate varicose veins, with ulceration, diagnosed obstruction of the iliac vein, and made an abdominal section, verifying his opinion. (It seems as if this report must be incorrect; for, with all the safeguards afforded by modern surgery, an operation so grave, merely for the purpose of confirming a diagnosis, would be unwarrantable.) Mollière[211 Mar.30] urges the distinction between pathological varicosity of the veins, met with in the young, and the physiological condition found as a result of senile changes in the old. The latter is only to be palliated; the former calls for active treatment. His plan is to employ a solution of 1 part iodine and 9 of tannin in 200 parts of water. The patient is made to walk about briskly for half an hour, and then a moderately tight band is placed around the limb above the selected point; a few drops of the liquid being thrown into the vein by means of a syringe with a double canula, the instrument is withdrawn, and the orifice is closed with iodoformized collodion. The bandage is left in place, and the patient is kept at absolute rest in bed for two weeks. At the end of this time the vein is converted into a small, hard cord, which soon ceases to be perceptible. Mollière claims that the liquid is not irritating, and quickly coagulates the blood. In a case of varix of the saphena vein of traumatic origin, Logan[39 Sept.16] excised about 28 inches of the vessel with success. The patient was a man aged 34, who had

sustained a crush of the leg eleven years before; the enlargement of the vein began at the seat of fracture, about 4 inches above the ankle, and advanced steadily upward; for eight years previous to operation he had had a series of ulcers.

The question as to the radical cure of varices by surgical procedure is discussed by Ricard.[100 Oct.30] He objects to the term "radical" on the same grounds which led Trélat to condemn it as used in reference to hernia, and urges that we can only say that the patients are relieved of the symptoms caused by the varices. Operation is justified, he thinks, by severe pain, by rupture of the affected veins, or by ulcers. It is of more value to persons of the laboring classes than to those who can provide the appliances and the care needful to afford them comfort. Two procedures should be regarded as legitimate: extirpation, applicable rather to cases in which the extent of vein involved is small; and ligation, which may be either direct or mediate. The former, which is preferable, consists in exposing the vein by an incision, and tying it; it may be done at several points. The latter is thrusting a needle, carrying a ligature, beneath the vein, which is tied along with the superjacent skin; this also may be done at three, four, or five points. Multiple ligation of varicose veins is strongly advocated by Phelps[1 Dec.28,'90] to remove disability for army, navy, or police duty; to guard against threatened hæmorrhage; to effect the cure of ulceration or eczema; or to relieve swelling of the feet with loss of power in the limb. He thinks the tying should be done subcutaneously, at such a number of points as to occlude the whole of the vein involved. Cases of excision of varicose veins of the leg are reported by Wyeth[101 Dec.,'90] and Weir.[9 Feb.15]

Zeidler[4 Sept.20] discusses the important question of the treatment of wounds of the femoral vessels. When the vein alone is opened, this vessel alone should be dealt with, by lateral ligature or suture if possible; if not, by double ligature and division between. The fear of gangrene after this procedure has been set aside by experiment as well as by clinical observation; such an occurrence is much less likely if the artery remains pervious. Under such circumstances the limb should be raised, even, according to Bergmann and others, to a vertical position. Zeidler cites the case of a boy, aged 14, with a knife-wound of both vessels 9 centimetres below Poupart's ligament, and that of a man, aged 25, in whom the injury was 6

centimetres below it; in the former case the femoral vein and superficial femoral artery were tied above and below and divided between the ligatures; in the other the wound in the artery was close below the origin of the profunda, and the femoral, profunda, external pudic, and external circumflex arteries, as well as the vein, were tied. In both cases it was noted that neither compression nor ligation of the arterial trunk arrested the flow of venous blood, thus setting aside the teaching of Langenbeck that hæmorrhage from the common jugular, axillary, external iliac, or femoral vein should be dealt with by ligature of the corresponding artery. In both healing took place favorably. An important point is that if the vein alone is wounded and tied, the elevation of the limb tends to prevent its engorgement and probable gangrene; but if the artery is also tied the horizontal position is best, as otherwise the supply of nutrient blood might be insufficient to maintain the life of the peripheral part.

Kammerer $\frac{1}{\text{May 10}}$ also discusses the treatment of wounds of the femoral vein. Experience has shown that the idea of cutting off blood-supply by tying the artery, or by tying both artery and vein, in these cases, is without value. Among 28 cases in which the vein alone was tied, gangrene occurred in but 2; in 19 of the 28 the vein was accidentally or unavoidably damaged during the removal of tumors. In 22 cases both vessels were tied, and gangrene followed in 12. Where the artery alone was tied gangrene ensued 25 times in 178 cases,—a smaller proportion than from tying both vessels, but a much larger one than when the vein alone was dealt with in this way. As to the channels through which the collateral circulation is established, it would seem from experiment that the internal saphena is of small value, but that the internal circumflex plays an important part. Increased tension in the venous system of the limb is apparently an advantage rather than otherwise. When practicable, lateral ligation or suture should be preferred to the placing of a ligature about the vessel itself. Two cases are given by Kammerer: in one both artery and vein were tied for accidental wound, and death occurred from gangrene of the limb a week later; in the other, during an attempt at removal of a tumor, the femoral and saphena veins were wounded and tied; the circulation was impeded for a few hours only, but the patient died.

A case of wound of the femoral vein, treated by ligation of this vessel and of the external iliac vein, is reported by Cox.[198 July] The patient was a man 22 years of age, who was injured by the forcing backward of a stick which he was using, with the end pressed into his right groin. Six hours after the ligation a somewhat profuse bleeding occurred from a branch opening into the femoral between the ligatures. Some œdema of the limb, with cyanotic discoloration, existed for several months, but gradually disappeared; nine months after the injury he was perfectly well. A case of fatal hæmorrhage from a ruptured varicose vein in a girl aged 23 is reported by Capes.[2 July 17] The patient was walking home from her work when the bleeding began; walked about 400 yards and then fell in a faint; she was lifted into a hand-cart and taken home, but died before her arrival there.

ORAL AND FACIAL SURGERY.

By RUDOLPH MATAS, M.D.,
NEW ORLEANS.

JAWS.

Caries and Necrosis.—J. M. Emmert, of Atlantic, Iowa,[568 Oct.] reports the case of a child, aged 5 years, with necrosis of the left upper maxilla associated with sloughing of the corresponding cheek, extending almost to the orbit, involving left side of nose posteriorly to within an inch of the ear, the upper lip to the median line, and a small part of the lower lip. The left upper jaw was entirely necrosed, the soft palate sloughing to the median line, and the disease also extending back into the pharynx. The necrosis of the soft tissues stopped abruptly at the median line; the right superior maxillary showed no sign of disease, even in the incisor teeth the soft as well as the hard tissues having a healthy appearance. The case ended fatally. The necrosis had been preceded about one and a half months previously by scarlatina, then by empyema (pneumonic), and finally by catarrhal pneumonia in opposite lung, during the course of which embolism of the right brachial developed.

At first sight this case would be considered one of noma, but the clinical history and limitations of the gangrene would tend to eliminate this diagnosis. Septic osteo-periostitis, with consecutive necrosis of maxilla, followed by septic gangrene of the cheek, would possibly fit the case. The author accounts for the condition by the theory of embolism or thrombosis of the second and third division of the internal maxillary, though this assumption hardly accounts for the gangrene of the soft parts of the face, which are supplied by the facial. The case is evidently illustrative of an acute septic process, and therapeutic measures did not appear to be of any avail.

A case similar to the above is described by Christovitch, of Salonica, Greece.[67 Nov. 15] A boy, aged 6 years, of healthy parents, was

taken sick with influenza in December, 1889. During the convalescence the mother noticed fœtor and swelling of the mucous membrane of the right cheek. Fever set in on the fourth day, and a gangrenous area was noticed which spread rapidly to the right half of the upper lip and invaded with special violence the osseous portion of the upper jaw. The whole of this bone was completely carious. The face on the right side presented an enormous œdema, which hid the eye completely. There was an abundant and fetid salivation and an odor of cadaveric putrefaction. The patient was in a desperate condition, but, as a heroic and last measure, Christo-

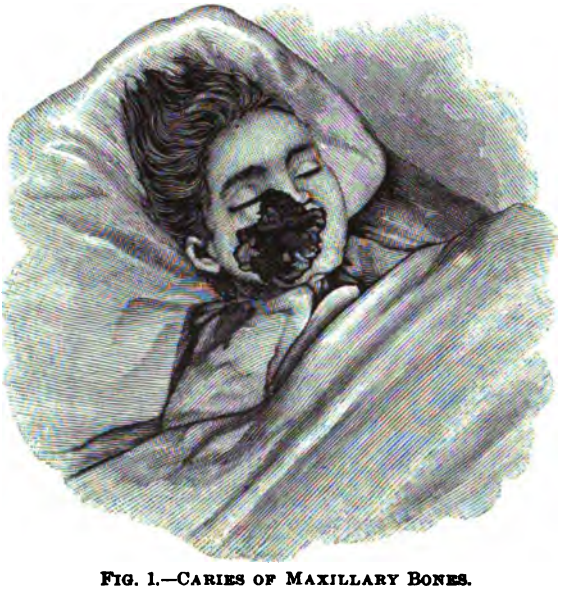


FIG. 1.—CARIES OF MAXILLARY BONES.
(*St. Joseph Medical Herald.*)

vitch performed a complete excision of the diseased upper jaw by which the whole of the osseous lesion was removed. The gangrenous soft parts were partially removed and burned with the Paquelin cautery, and the cavity packed thoroughly with iodoform gauze. In two months there was complete recovery without marked deformity.

C. Walther [7] Nov. 22, '90 reports a case of exceptionally extensive necrosis of the lower jaw resulting from osteomyelitis in a child. The sequestrum represented the whole ascending ramus, with the condyle and coronoid process. Child made good recovery.

A case of total necrosis of left upper jaw and malar bone is

reported by N. Herbert, Aden, Arabia, 2 Nov. 22 in an Arab boy aged 15 or 16 years. Orbital margin of dead bone projected through a gap in the cheek, and the lower eyelid was drawn down toward it and everted. The bone was easily extracted through an anterior incision. The disease was stated to have begun in a "boil" at the orbital margin three or four years before, and had progressed without pain or acute symptoms of any kind. The boy seemed of good constitution. In the specimen the two bones are complete except the posterior and neighboring inner wall of the antrum and a part of the nasal process, which are pitted in places from superficial caries, especially the palatal process. Most of the teeth had dropped out, and the remaining ones were carious. Recovery was complete.

FRACTURES.

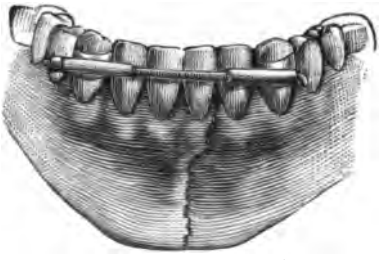


FIG. 2.—ANGLE'S ANCHOR SPLINT IN SIMPLE FRACTURE OF THE LOWER JAW. (*Medical Record.*)

Under this title several excellent papers have been contributed during the year. "The Treatment of Fracture of the Maxilla," by Kasson C. Gibson, of New York, 805 Aug. is a practical essay, abounding in illustrative cases and original suggestions. Edward H. Angle 59 May 31 divides these injuries into three classes: I. Simple fractures, in which the teeth are good and sufficiently sound and firm in their attachment (especially on each side of the fracture) to afford good anchorage for the appliance which supports the fracture. II. All fractures where the teeth are unsuited, by disease or any other cause, for anchorage, but are sufficient to give correct articulation of the jaws when they are in proper adjustment. III. All fractures of jaws which are edentulous.

I. The first class is illustrated by a case in which a simple fracture of the jaw was sustained through the symphysis, terminating in front between the central and lateral on the left side, as shown by the line in the engraving (Fig. 2). The fractured bone was widely separated at the top, and the left central incisor was loosened. The following treatment was practiced: first, the ends of the bone were placed in their proper position and temporarily fastened by lacing the teeth with silk ligatures; second, bands of very thin German silver were made to encircle and accurately fit

the cuspid teeth. A small tube of German silver, ½ inch in length, was soldered to said band and in exact alignment; a piece of wire, accurately fitting the bore of this tube, bent at right angles at one end and having a screw cut upon the end, was slipped through each tube and secured thereon by adjusting a nut on the screw. The bands were cemented in position upon teeth by means of oxyphosphate cement, as shown in Fig. 2. After the cement had become thoroughly set the rent was tightened until the ends of the bone were drawn snugly together. These bands, tubes, wires, screws, and nuts are some of the appliances known as the "Angle Regulating and Retaining Appliances," devised and used for correcting irregularities of the teeth (Fig. 3).

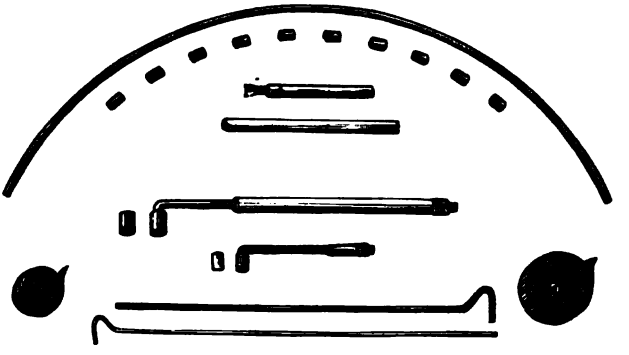


FIG. 3.—ANGLE'S REGULATING AND RETAINING APPARATUS. (*Medical Record.*)

In the case reported the appliance was worn without inconvenience or displacement for twenty-one days, when it was removed, the bone having been firmly united. On the third day after the application of the apparatus the patient was able to eat freely and use his jaw. This device may be applied in any locality on either jaw, provided suitable teeth for anchorage be not too remote from the seat of fracture. The screw may be bent to accommodate the curve of the jaw, should fracture occur in the region of the cuspid.

II. The method applied to cases of the second class may be understood from the treatment in the following instances: A male aged 45 received a blow from a police club, producing two simple fractures of the inferior maxilla. The first was an oblique fracture of the right side, beginning with the socket of the second bicuspid,

extending downward and backward, involving the socket of the first molar, breaking out the second bicuspid, and greatly loosening the first molar. The second molar had been lost a year before, while the third, as well as the remaining teeth, were much abraded and loosened by salivary calculi, thus making the application of the appliance described in Case I impossible. The second fracture was situated in the opposite side, high up the ramus. The patient was unable to close the jaws. The fracture on the right side was widely separated, and the anterior piece was much deformed by reason of the contraction of the digastric muscle, while the posterior piece of bone was drawn firmly up, the molar tooth occluding. Bands were made to encircle all four of the cuspid teeth, they being the most firmly attached to their sockets; the fractured ends of the bones were placed in careful apposition, the lower jaw was closed carefully, occluding the lower teeth upon the

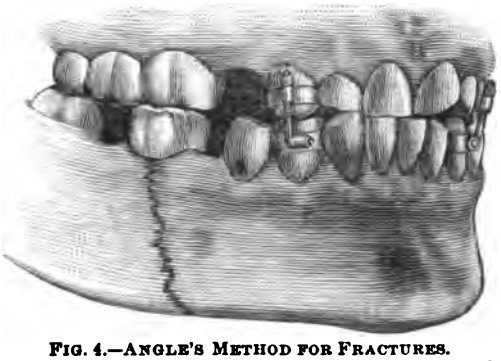


FIG. 4.—ANGLE'S METHOD FOR FRACTURES. (*Medical Record.*)

FIG. 5.—ANGLE'S IMPROVED FRACTURE-BANDS.

upper, and requiring so great force and occasioning so much pain that an anæsthetic was required. Points on bands required for the necessary attachment were carefully noted. The bands were then slipped off the teeth and little pipes (*vide* Fig. 4) were soldered at the marked points, after which the bands were cemented in their proper positions upon the teeth, and two small, traction screw wires were drawn firmly together, and each tooth occupied its exact normal position in occlusion with its fellow on the opposite jaw. Tooth fractures were then carefully examined, and found to be in perfect apposition.

As illustrations of the mechanical treatment of the second class, the author adds another very interesting case, in which a bilateral fracture had been sustained thirty-two days prior to treatment by Angle's method. In this instance, after reducing the

fracture and bringing the teeth in apposition, the improved fracture-bands shown in Fig. 5 were used with excellent results.

In using these bands no cement is necessary, and, instead of of the screws, small metallic buttons are soldered to the side of the bands (as shown in cut), around which is wrapped in the form of a figure 8 fine binding-wire, as shown in Fig. 6. Angle believes that the patients are able to obtain sufficient nourishment until the repair of the fracture is complete, and claims as the special advantages of his procedure: (1) cleanliness; (2) comfort to patient, as compared with many other bulky and awkward appliances; (3) its extreme simplicity, enabling any one with ordinary mechanical ability, when provided with a set of clamp-bands, to easily and

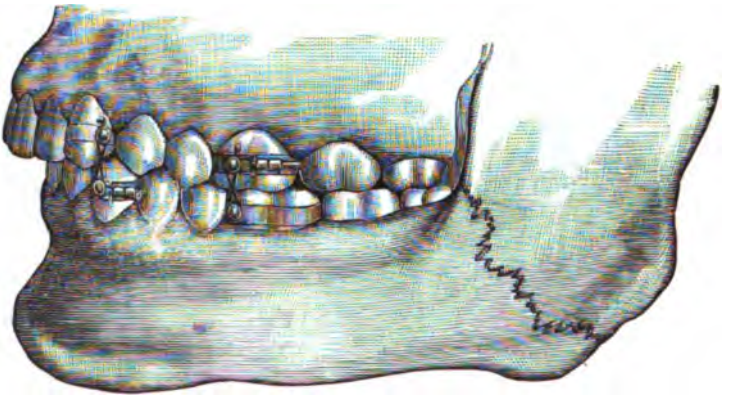


FIG. 6.—ANGLE'S IMPROVED FRACTURE-BANDS APPLIED.
(*Medical Record.*)

quickly set all ordinary cases of fracture; and (4) the certainty of correct results.

III. Cases comprising fractures of edentulous jaws are, fortunately, very rare. The method of treatment proposed by the author in such cases is similar in principle to that already applied in the first class, except that in place of teeth small bone hooks are used; a suitable cavity for their reception being drilled on each side of the fracture coincident in position with the original sockets of the teeth, as if implanting teeth were intended, save that the cavities then made need not be nearly so large or so deep. They should also be drilled obliquely to correspond to the course taken by the hooks.

Cuthbertson[39] reports a case of fracture of the zygoma in a

young man, resulting from a blow struck with the fist. There was a depression over the zygomatic arch. Other practitioners, who examined the case, doubted the existence of fracture, believing the condition to be due to a congenital depression of the bone. There was no pain, swelling, or bruising, notwithstanding the fact that the patient had been injured on the day of examination.

A very interesting case of multiple compound fracture of the lower jaw, caused by the bite of a hunted grizzly bear, is reported by W. F. Edgar, of Los Angeles, Cal.[59] After trying several devices, the expedient of drilling the bones and wiring the fragment finally succeeded in securing permanent and good union.

C. A. McGuire[801] reports a severe case of fracture of the inferior maxilla, involving right antrum, which was successfully relieved by orthopraxis.

DISLOCATIONS.

Henry Lee[6] reports the case of a boy 4 years old who fell some 30 feet out of a window. There was no fracture after the fall, but the submaxillary glands became very much enlarged, and for many months there was a constant dribbling of saliva. Frequent attacks of earache and deafness supervened. Seven years after, Lee examined the patient and discovered that dribbling of saliva continued to some extent and the left submaxillary gland continued enlarged. The mouth could be opened only to one-half of the natural extent and the power of rotating the lower jaw had been lost. A distinct depression could be felt at the place naturally occupied by the interarticular cartilage of the left side. There was difficulty in pronouncing some words distinctly. The jaws came evenly together when the mouth was shut. The ptyalism and enlargement of the submaxillary gland are accounted for by the irritation of the chorda tympani caused by the displaced cartilage.

This is probably the only recorded instance of this dislocation. Should a similar case present itself, the cartilage might probably be made to resume its natural position by an operation similar to that for ordinary dislocation of the jaw. It might be supposed that if interarticular cartilage on one side only were displaced, that side of the jaw would be a little higher; but it must be remembered that the centre of this cartilage is very thin and often perforated, so that its removal would make very little, if any, difference in the position of the condyle.

An instructive case of *bilateral* dislocation of lower jaw in an adult aged 30 is reported by Brockway. 764 May About thirteen months before admission, during an attack of vomiting, patient dislocated both condyles of lower jaw. On admission lips could be approximated and saliva retained; mastication, deglutition, and speech were very imperfect, and she took fluid diet solely. Lines of teeth about ¾ inch apart and that of the lower jaw projected ½ inch beyond that of upper. Chin depressed and prominent, lower jaw nearly immovable. Patient's condition and appearance were not distressing, and she desired relief mainly to be able to take solid food. Under ether unsuccessful attempts at resection were made. Efforts by manipulation produced only slight motion toward replacement of left condyle. A horizontal incision below left zygoma was made, which exposed the stretched, untorn capsule of joint surrounding head of condyloid process. The glenoid fossa was filled with fibrous tissue, which was allowed to remain. By means of a blunt instrument placed in the sigmoid notch, this condyle was forced back over articular eminence and made a depression for itself in the newly-formed tissues of old joint-cavity, but did not tend to stay in place. Manipulation now failed to restore the right condyle, and a similar cutting operation was done over this articulation. Then, with an instrument in either sigmoid notch, the jaw was reduced, the teeth could be approximated, though still protruding about ¼ inch, due to the filling up of the glenoid fossæ. Wounds were sutured, with drainage and dressings, and jaw held in place with plaster of Paris. Patient was fed through a tube introduced at site of an extracted tooth. On seventh day was allowed limited use of jaw for eating and talking, and on tenth day was discharged cured. One case of reduction by manipulation, after four months, is reported.

Another interesting case of double luxation of traumatic origin (fall) is reported by A. Bossion, Algiers, Africa. 127 Nov. 12 The patient, a male aged 31 years, fell a distance of 2 metres and dislocated his lower jaw bilaterally. The dislocation was reduced under chloroform, but it recurred twenty-two times in the course of a year, at times from the most trivial causes. He was finally radically relieved by the application of an immobilizing apparatus after the reduction of the last luxation, by restriction to a milk diet for some time, and by faradization of the temporal and masseteric regions.

OCCLUSION OF JAWS.

A case of twenty-seven years' duration in a woman aged 34 years was successfully operated upon by J. Ewing Mears.[9 Nov. 22] The patient was badly salivated when 6 or 7 years of age, causing considerable destruction of tissue and extensive adhesions. Notwithstanding that the space between the teeth would just admit the point of a thin knife-blade, she had been doing duty as a teacher, talking through the teeth. She also presented a condition which has been noted in cases of the same nature,—non-development of the lines of the bones and soft tissues of the face. She was about 5 feet 8½ inches tall, and yet she had the face of a child,—what Mears has designated as a "baby-face." Since the operation this appearance changed, and she now has the face of a woman.

Previous to operation the buccal space was entirely obliterated. There was simply an opening between lips, through which could be seen only the incisors and canine teeth of the upper and lower jaw. The case was one of cicatricial occlusion. She was etherized and an incision made through cicatricial tissue on each side, and the mouth forced open. At the same time Mears removed nineteen teeth. Those of the lower jaw crossed under the tongue, those of the upper jaw projected in various directions, so that in the oral cavity proper there was scarcely room for the tongue. These teeth erupted after the jaws became occluded, and, not being able to develop in a proper manner, had taken the position described. The cavities made by the incision were packed with 5-per-cent. iodoform gauze. The second stage of the treatment consisted in the passage of ligature through the cicatricial mass. These ligatures, being deposited as deeply as possible on either side by means of a long needle with an eye near point, were brought out on a line with the position of the last molar tooth; they consisted of heavy silk, twisted and carbolized, and tied loosely. In conjunction with this, Mears used an apparatus which he devised some years ago for opening the mouth, etc. Some contraction followed the division of the cicatricial mass. The object in passing the ligature was to get a canal or track which, after a time, would be lined by mucous membrane, and could permit division of the overlying tissues without reformation and reunion, as we treat webbed fingers or toes. In three weeks' time the tissues over the ligatures were divided and the ligatures were re-applied, using two on each side, one above

the other. These were allowed to remain in place for three weeks, when the overlying tissues were again divided, and it was found that an opening of 1¾ inches had been secured. The use of the instrument was continued for some time after the patient's return to her home. One year after, she opened her mouth 1½ inches between artificial teeth. Mears says the result in this case was similar to those he has secured in other cases in which he had adopted the plan of treatment by ligatures. He has from time to time tried simple division of the tissues, but invariably the jaws have again closed. All the incisions were made and the ligatures deposited within the mouth. He reported other cases of this kind, one in which he opened the mouth of a gentleman in whom the closure was of seventeen years' standing, and, although 32 years of age, he had never grown any beard. As soon as the man regained the use of the jaw the beard began to grow and the face was soon covered with hair. This can probably be explained by the increased circulation brought about by the use of the muscle.

In discussing the paper, Allis and Mears laid stress on the miserable condition of persons afflicted with this trismic condition. One patient, a boy, crowded a large quantity of pie between his teeth by the aid of a knife and a stick, so that he was in great danger of asphyxia. It is impossible to treat throat trouble; vomited matters must escape through the nose; feeding is possible only with fluids. As Allis said, there is no operation that is a greater boon to such patients than that described by Mears.

At the meeting of the Surgical Section of the Suffolk District Medical Society, A. T. Cabot[131] read a paper on bony ankylosis of the temporo-maxillary joint relieved by osteotomy of the neck of the inferior maxilla. He reported 3 cases in which the operation had been done with permanently good results. In the first case, only the neck and head of the condyle were removed, but in the two others, owing to extensive new formation of bone, it was necessary to cut away the coronoid process as well. In all 3 cases the functional result was excellent.

The writer gave his preference to the external incision of Bottini rather than to the internal operation of Mears, on account of the greater exactness with which the operator could, by the outside incision, remove just as much of the bone as was necessary, and because he felt that in the last 2 cases reported by him the forcible

twisting off of the upper end of the ramus would have been very difficult, and its thorough removal well-nigh impossible.

He called attention to two signs by which, in a jaw ankylosed on one side, it could be determined which condyle was fixed: first, the slight springing that such jaws are capable of by forced efforts at mastication is a little more noticeable on the side on which the condyle is free; and, secondly, owing to the loss of bone which accompanies the ankylosis, the lower jaw is displaced toward the affected side, which displacement can be perceived by comparing the intervals between the upper and lower incision.

Allingham [2] reports an interesting case of ankylosis of the temporo-maxillary joint, successfully treated by excision of condyle and neck of jaw. A boy aged 8 fell from a wall 10 feet, upon the point of the chin. Pain in and a progressive stiffness of the right temporo-maxillary joint followed. Various attempts were made to force the jaw open, but they only improved the condition temporarily. Finally, the following operation was performed under chloroform anæsthesia: An incision was made over and along the zygoma for about 2 inches, and downward along the posterior margin of the jaw for some distance. The skin was dissected downward off the parotid fascia, and the fascia and the masseter were then divided from the lower border of the zygoma and pushed down so that the facial nerve and parotid gland were left untouched. The external carotid was accidentally divided, and had to be tied. When the masseter had been separated to the same extent as the skin incision, Allingham introduced a small saw (Adams's) and tried to saw through the neck of the jaw, from above downward, so as to weaken the bone; he could not completely saw this through, and with difficulty succeeded in passing one limb of a curved-cutting bone forceps over the sigmoid notch, and with great force cut the bone obliquely through the partially sawn, and therefore weakened, portion. He endeavored to disarticulate it, but the condyle was too firmly ankylosed. Then, after freely dividing the capsule, he put an elevator into the joint and forced the condyle from the temporal bone. After a few cuts the soft parts divided and the condyle and neck of the jaw were removed. There was no bleeding, and a drainage-tube was introduced. The masseter and parotid fascia were sewn with buried catgut suture to the zygoma,

and the skin with horse-hair sutures, etc. This operation was performed December 7, 1877. On November 2, 1888, nearly one year after, examination revealed that the patient had been permanently and perfectly cured of his locked jaw. Allingham expresses himself well pleased with the result, and will not hesitate to resort to this method of treating ankylosis of face in similar cases.

Oberst, of Halle, [89] in a paper on the "Treatment of Defects of the Mucous Membrane of the Cheeks," lays special stress on the correction of cicatricial trismus resulting from the operative treatment of malignant disease involving the buccal region. He says: "When a severe cicatricial contraction follows the extirpation of a carcinoma of the mucous membrane of the cheek, the patients are much worse than before the operation, since before the removal of the tumor (which usually interferes very little with the ability to open the mouth) they can alleviate their sufferings with frequent antiseptics and soothing mouth-washes. Feeding, which before was unobstructed, is extremely troublesome, and the secretions from the ulcerating carcinoma (when recurrent) flow continuously in the mouth, and can only be removed with great difficulty, and, at the best, imperfectly. Inflammation of the mouth follows, and the proliferation of the neoplasm becomes more dense. A part of the secretions of the cancer is swallowed or aspirated during sleep, causing catarrh of the stomach, bronchitis, or pneumonia, by which the sufferings of the patient are considerably increased." Oberst is convinced that, in cases of carcinoma involving the mucous membrane of the cheek, the operator should either refrain from interference, if the probability of recurrence was great, or, at all events, should operate by some method which would effectually prevent that most disastrous complication,—cicatricial lock-jaw. In two cases in which Oberst recently operated, the cicatricial closure of the jaws was successfully avoided by covering the greater part of the defect immediately after the extirpation by a plastic of the mucous membrane. The cases were:—

1. An ulcerating tumor of inner (mucous) surface of left cheek, as large as a five-mark piece. Tumor extended from second molar to commissure of mouth, and above and below to gingivo-buccal angle. Skin over tumor intact; no infiltration. Mouth could be opened to normal extent.

Operation.—The growth was extirpated by external incision from the labial commissure to the middle of cheek, allowing a free excision of the growth beyond the diseased area. From this, a very large defect in mucous membrane of cheek had arisen, which, left to itself, would, without doubt, have caused considerable functional disturbance. To avoid this, a flap of mucous membrane was dissected from above and below, in front of the defect (see A and B in Fig. 8), and belonging each respectively to the upper and lower lips. Each flap measured 2½ centimetres in width, and was raised from the underlying submucous tissue sufficiently to allow it to meet the other flap over the

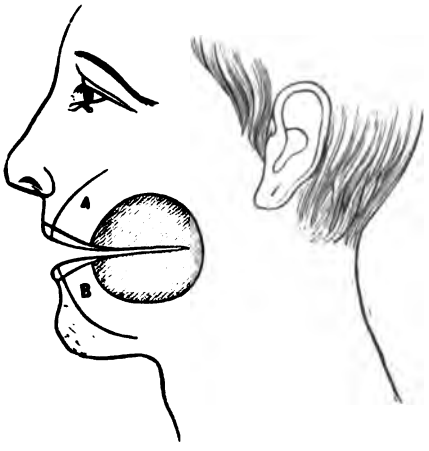


FIG. 7.—OBERST'S METHOD OF PREVENTING POST-OPERATIVE OCCLUSION OF JAW.

A, B, mucous flaps.

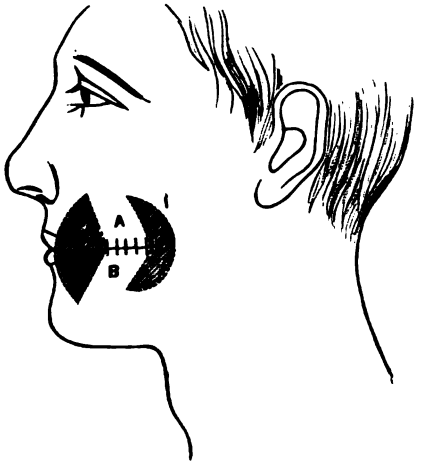


FIG. 8.—OBERST'S METHOD OF PREVENTING POST-OPERATIVE CICATRICIAL OCCLUSION OF JAW.

A, B, mucous flaps sutured and *in situ*; D, D', unprotected areas which are allowed to heal by granulation.

(*Deutsche Medicinische Wochenschrift.*)

middle of the defect. The two flaps were then united with catgut sutures and the external wound closed by other stitches. The circular defect caused by the extirpation of the tumor was early covered by a broad bridge of mucous membrane, which left only two narrow segments, in front and behind respectively, uncovered by mucosa, and which would finally heal by granulation. These unprotected areas, however, were not feared, as cicatricial contraction would not seriously affect the movements of the jaw, since the main gap was even.

2. This case was more extensive and required a greater sacrifice of the mucous membrane; still the gap was protected by an opera-

tion based on the plan adopted in the preceding case. Several days after the operation both patients were able to open their mouths to normal extent, and no bad tendency was noticed one month after the wounds were healed.

Oberst recommends his method for cases similar to those reported and for the treatment of not too extensive defects of mucous membrane which may result from other causes, such as tubercular and syphilitic ulcerations.

In very extensive tumors and cicatrices the method is not sufficient to prevent secondary cicatricial contraction, and one of the known methods of meloplasty—*μῆλον*, cheek; *πλάσσειν*, mold—(Gussenbauer's, J. Israel's, Hahn's, Kraske's) should be preferred. In all these methods flaps of skin which are turned with their epidermal surface toward the oral cavity are to be utilized to cover the defect.

The Obviation of Cicatricial Contraction of the Jaw by the Transplantation of a Skin-Flap.—Brohl, of Cologne, states that the unsuccessful treatment of cicatricial contraction of the jaw by division of the cicatrix and gradual dilatation of the contraction, as well as the poor results obtained by making an artificial articulation according to the plan of Esmarch and Rizzoli, have proven that the replacing of the cicatricial tissue by normal skin is the only operation capable of producing a permanent cure.

Thiersch's method of skin-grafting cannot be used in these cases, and only flaps nourished by pedicles can be utilized. Excellent results were obtained by Gussenbauer,[755] who replaced the mucous membrane by skin-flaps taken from the cheek, and covering the defect thus produced by other flaps taken from the neck or chin, doing, at the same time, a cheiloplasty of the already deviated mouth. This method is excellent, but has two faults: first, a difficult plastic at the angle of the mouth; second, the formation of extensive scars on the face.

Bardenheuer[69] succeeded in overcoming all these objections, as will be seen by the following case: A girl aged 21 years was treated in 1888 by injections of gray oil for syphilitic ulcerations of the vulva. In the beginning of 1889 she was attacked by a marked and rapidly spreading stomatitis ulcerosa, which, notwithstanding vigorous treatment, brought on extensive necrosis of the lower jaw and a marked cicatricial contraction of the mucous

membrane of the right cheek. On April 8, 1889, she was admitted to the hospital, and, owing to extensive cicatricial bands between the gums and cheek of the upper and lower jaw on the right side, she could hardly open the mouth over 2 millimetres. Four teeth had been removed for caries, but the others were sound and the stomatitis was perfectly cured.

On April 20th, Bardenheuer, by means of an incision 8 centimetres long, parallel to the border of the lower jaw, removed the cicatricial bands, so that the mouth could be opened completely by a speculum. At the same operation he marked out a double pedicled flap, one bridge of which was on the right clavicle, while the other was in the direction of the ramus of the jaw and about 2 centimetres from it. The wound along the border of the jaw was packed with gauze. On May 8th the flap was dissected away from the underlying tissue and its lower bridge gradually cut away. This was completed May 15th, when the flap was twisted in its upper pedicle and the granulation scraped off; the flap was passed through the wound along the border of the jaw, drawn into the mouth, and fixed in position by silk sutures which went entirely through the flap and cheek. The wound in the mouth had been freshened. The defect in the clavicular region was freshened and sewed. On June 4th the pedicle of the flap was cut through and sewn in the wound of the jaw, and the loss of substance on the neck was covered by skin-grafts according to Thiersch's method.

The wound along the angle of the jaw was completely healed July 26th. During the whole course of the treatment much stress was put on the frequent cleansing of the mouth and its frequent opening and dilatation by a Heister speculum. Seven months after the operation the patient could open her mouth perfectly and separate the teeth over 2 centimetres. The only scar on the face is along the border of the jaw, and is not adherent to the bone. The patient can now be regarded as completely cured.

At the Seventh Congress of Italian Surgeons, Bajardi, of Florence, $\frac{8}{\text{June 19}}$ reported a case of congenital closure of the jaw, which had its beginning, he believed, in a contraction of the masseters. Notwithstanding this, he resected the condyle first, then the muscle process; this procedure proving fruitless, he cut through the masseter. A cure, with restitution of functional activity of the lower jaw, was

accomplished. Bassini, of Padua, [8 June 19] had an opportunity of seeing 2 cases of permanent closure of the jaws, in which the closure of the mouth depended upon a deviation of the muscle process (coronoid process?). This process was more vertical and longer than usual. He obtained complete cure by intra-buccal osteotomy of the process named.

Warren [131 Feb. 15] reports a case of noma and bony ankylosis of the jaw in a boy aged 9 years. When first seen (about one year ago) there was a large opening in his right cheek, exposing the teeth of the upper and lower jaw as far back as the first molars. This was the result of a destructive ulcer which had followed scarlet fever. The skin was adherent to the gum at the edge of the opening, and the jaw finally ankylosed. The opening was closed by a skin-flap taken from the region of the clavicle. This flap was split in two, and part of it utilized for mucous membrane and part for cheek. The ankylosis was relieved by section of the ascending ramus of the jaw. The result was excellent. The opening in the mouth was wholly closed, and the movements of the jaws were quite free.

TUMORS.

Leontiasis Ossea.—Under the title of "Diffuse Hyperostosis of the Upper Maxillæ," L. Poisson, of Nantes, [8 Jan. 1] discusses the curious and obscure condition known more familiarly by the name of leontiasis ossea (Virchow). This disease is, by its course, more or less symmetrical in character, and is distinguished absolutely from the exòstomas of the antrum which involve the surrounding parts, also from the eburnated exostoses of the face, the osteo-periostites (intra- or extra- alveolar), and from the hypertrophic variety of osteo-periostitis. It is equally distinguished from sarcoma, which may, however (in 2 cases, at least, that were reported by le Dentu and Pacquet), graft itself upon pre-existing hyperostosis. The reported cases, if we accept only those which are indisputable, are not very numerous, about 10 in all. The oldest observation is Ribell's (1823) and the latest Poulas's (1886). Brown [90 Mar.] reports a case which would bring the latest report to March, 1890. The symptoms observed are uniform enough to permit of a general description, and even to attempt a definition, of this affection. It may be said to be a disease characterized by

a hyperostosis that is most often bilateral and symmetrical; which begins ordinarily by attacking the upper jaws, and especially their antra; which causes prominences under the skin of the face and projections into the nasal passages; which tends to propagate itself in the bones of the face and cranium; which makes its *début* in youth, and progresses with exceedingly slow steps until it ends in death in virtue of the fatally progressive development.

The author details the following case: Mlle. X., Nantes, aged 42, has a tumor on each side of the nose, seeming to disappear in the groove between. The right tumor is more voluminous than the left, and is as large as a hen's egg. They are absolutely hard and blend with the bone, of which they appear to be an integral part. They are smooth, and follow the contour of the nasal processes of the maxillæ, and in this way retain the outline of the nares; they encroach, however, on the nasal passages, which they obliterate, and spread laterally to the maxillary sinuses. The malar, zygoma, and frontal are more developed on the right than on the left. The parietal and occipital would appear also to be slightly enlarged on the same side.

The history of the case is as follows: At 16 she first noticed a slight swelling in the region of the right nasal process. At 17 this swelling was large enough to interfere with the respiratory function of the right nares. In these two years the external growth had enlarged to the size of a small nut. All this appeared to come *sine causa*. Fourteen years after the appearance of the first swelling the left nasal process of the maxilla began to show signs of hypertrophy, and very slowly grew until it also obliterated the left nasal passage, and had attained the present unsightly dimensions.

The patient was born prematurely,—a seven and a half months' gestation. She was a weakly, puny babe, and was never expected to live; nursed on the breast for three months, and from this time on artificial food. She was always weak. She did not begin to walk until 3 years, giving evidence of rachitis. Her first (milk) teeth did not appear until the 10th year. Her present teeth are irregular and dwarfed.

There is absolutely no hereditary history. No syphilis, no neuropathic record of a hereditary character. Nothing to elucidate the etiology. The sexual history is marked by profuse menstrua-

tions, which last eight days. Local examination reveals no tangible cause for this. The author carefully studies the causes that have been marked by other authors, but it is evident that nothing accounts clearly, in a direct or indirect manner, for this remarkable trophic condition. In considering the nature of the disease, he quotes Virchow's well-known analogy between leontiasis ossea and hypertrophic elephantiasis of the soft parts. Syphilis has nothing to do with the etiology, if the history of the case and inutility of the specific treatment are to be regarded as tests. The frequency with which erysipelas complicates these cases increases the analogy with elephantiasis, and is supported by the case, Poisson's patient, who suffered with this complication on two occasions. In the way of treatment nothing can be done. Poisson operated with the view of temporarily correcting the repulsive appearance, and had no trouble in removing by the gouge and chisel the most prominent and disfiguring projections on the face. The cosmetic effect was good. The bone removed was soft, friable, and presented, on careful microscopic examination, the characteristic appearances of rarefying osteitis. The periosteum was not thickened, and easily peeled from the underlying bone. In conclusion, the author asks: Is the disease a trophic disturbance of neuropathic origin?

John Brown [90 Mar.] contributes a case which differs from Poisson's in many respects, and particularly in the fact that the disease appeared first in the lower jaw and hyoid bone: W. J. S., aged 29, married. At the age of 9 years the lower jaw was larger than normal, the enlargement increasing slowly and painlessly until the 13th year, when the hypertrophy of the upper maxillary and malar bones became well marked. The hypertrophy was most rapid from the 16th to the 24th year, but lately it has not been so active. The patient has always enjoyed good health and has been able to follow his work as mule-piecer. His face at the present time is much enlarged and deformed (?). It is not symmetrical, the left malar and nasal processes of upper maxilla being larger than right. During the past four or five years the enlargement has encroached upon the orbital, nasal, and oral cavities. The orbital fossæ are lessened, causing exophthalmia of both eyes, especially the left; displacement of left nasal duct, causing epiphora; narrowing of the nasal fossæ, causing loss of smell, which has been absent

for five years. The oral cavity is contracted, owing to the enormous hypertrophy of both alveoli. The movements of the jaw are natural; mastication and swallowing are normal. Speech is slightly muffled. The tongue is not enlarged. Taste, sight, and hearing are good. There has been no disease of the soft parts, although these are not freely movable over the enlarged bones. The skin over the left malar is very tight and has a slightly congested appearance. The nasal cartilages are not enlarged. The body of the hyoid bone is larger on the right than on the left side. The bones of the cranium are normal. Patient's height is 5 feet 7 inches; weight, only 119 pounds. No syphilis. Father and

FIG. 9. FIG. 10.
BROWN'S CASE OF LEONTIASIS OSSEA.
(*Medical Chronicle.*)

mother living, both healthy, and have no history of cancer or any constitutional disease. The patient was their only child.

Two other cases are referred to by the author. Bickersteth's (of Liverpool), also quoted by Poisson, and one reported by J. Bland Sutton.[1114] (See Section A, vol. iv.)

This, like Poisson's case, should not be mistaken for acromegaly (Marie's disease), as the lesion was strictly osseous, there being no hypertrophy of the hands or feet or overgrowth of the tissues over the bones of the face.

The accompanying figures show the deformity of the face better than any description.

Cystic Tumors.—W. B. Rogers, of Memphis,[849] classifies the

cystic tumors of the lower jaw into (1) cysts occurring in connection with teeth; (2) cysts not connected with the teeth and finding origin in the bone proper. Cysts in connection with the teeth are: 1. Polyp-like, attached to the roots of the "cut" or fully developed teeth [teeth-root cysts, Haderup; kystes périostiques des mâchoires, Magitot—Ed.]. 2. Dentigerous cysts, dependent upon the presence of uncut teeth [follicular cysts of jaws, Broca; teeth- or sac- cysts, Haderup—Ed.]. The cystic tumors occurring in the jaw independently of dentition may be classified into simple or compound in accordance with the mono- or poly- locular arrangement of the cyst.

The author remarks: "Cystic tumors of the inferior maxilla are by no means of rare occurrence, and, whatever be their several sources of origin, they present some features in common, namely, slowness in growth, absence of severe pain, absence of glandular involvement, with no constitutional impairment except as attends on any tumor interfering mechanically with mastication and deglutition. The exploring needle reveals the cystic character of these tumors.

Cysts attached to *roots of teeth* can only be diagnosed *in situ* after incision, and are of extremely rare surgical importance.

Dentigerous cysts usually attend on second dentition, rarely in connection with milk-teeth, and still more infrequently have they been found with supernumerary teeth. It is only in the comparatively early stages of growth of a dentigerous cyst, before it has by increase of size involved the sites of many teeth, before the patient's memory has become clouded as to the exact point at which "the swelling was first noticed," before all normal landmarks have changed or passed away, that a diagnosis is at all easily arrived at. Later than this, when the tumor is large and definite information concerning missing teeth is unobtainable, there are few, if any, points of diagnostic value: nothing short of incision will tell the nature of the tumor. The leading point in a positive diagnosis is the fact that some one tooth (or teeth) which should be present, and that, too, at the site of the tumor, has never shown itself.

The illustrative cases reported by the author are: 1. A monolocular cyst; white woman, aged 43 years; right half inferior maxilla. Growth, six years' duration. Size of average cocoa-nut.

Tapped first, withdrawing more than 1 pint of chocolate-colored, glairy fluid. Three weeks after tumor refilled. Tumor dissected out; almost entire right half of maxilla resected. Recovery rapid. 2. Multilocular cyst of lower jaw: female, colored, aged 40 years; growth on left half lower jaw; cocoa-nut size. A small exploring trocar revealed several cysts, with as many varieties of fluid. No glandular involvement. Excised tumor with portion of jaw. Complete recovery in eight weeks. 3. Multilocular cyst

FIG. 11.—ROGERS'S MULTILOCULAR CYST OF LOWER JAW.
(Memphis Journal of Medical Sciences.)

of right half of lower jaw in negro aged 28 (see Fig. 11). Same operation as above, and the tumor identical in make-up, excepting two of the cells composing the mass contained brain-like matter, causing author to fear return of disease. Rapid recovery. Three years after patient still in excellent health.

Herzfeld[41] reports an adventitious cyst of the upper jaw, possibly due to trauma. It was easily evacuated by penetrating into the processus palatinus above the right incisor. The cavity appeared to be filling up with the aid of alcoholic solutions of car-

bolic acid. Villeneuve and Metaxas,[46] report an instance of tooth-root cyst opening into the antrum. The cyst was connected with the right lateral incisor, which was extracted. The cyst was thoroughly evacuated by incision and dressed by packing with iodoform gauze. The patient, a male aged 25, was rapidly recovering, the cavity closing at time of report.

Other Tumors.—A case of enchondroma in a patient aged 50 (duration, ten years) was successfully removed by excision of the superior maxillary, performed by Beach, of Boston.[99] Two osteomata of the upper jaw are reported by A. Pilliet,[7] who states that "these two tumors are not embryonic osteomata, which consist of medullary elements, as those described by Bouveret. Neither are they adult tumors composed of compact tissue. They suggest the appearance of fœtal bone shortly before birth. To compare them to a normal type, they may be said to present the appearance of young, osseous stroma in process of development; but there is this difference,—that the secondary absorption, which should give to this bone its final form and limit its development, has not taken place in them."

A case of a large *osteoma*, successfully removed by excision of the superior maxillary, to which it was entirely limited, is described by Bernays,[786] who reported in the same meeting a case of melanosarcoma, removed by the same procedure, also successful.

Among the isolated reports of tumors of the upper jaw which deserve special mention as models of painstaking and intelligent observation, we must mention the 3 cases given by Lancial, of Lille.[220] As the author observes: "There are still some unknown peculiarities, especially in connection with the malignant tumors which affect the upper jaw, which deserve attention, as, for example, the differentiation of tumors involving the body of the jaw, properly speaking, from those of the antrum; the diagnostic signs of epithelial cancer and its differentiation from other varieties."

The 3 cases reported furnish material which partially elucidates these points. They are as follow:—

1. Epithelioma of epidermal type (*épidermiques*), starting in the gum of the upper jaw. Male, aged 27. Resection of bone. Recovery.

2. Fibrosarcoma of the medullary type (*myeloplaxes*). Upper jaw in a child aged 12 years. Resection of jaw. Recovery.

3. Encephaloid sarcoma of the left maxillary sinus. Total resection of the upper jaw. Recovery. Patient aged 18 years.

In the upper jaw, according to this writer, there may be three distinct varieties of epithelioma. The first begins in an epithelial bud, which starts from the adult gum mucosa; the second is developed from the *paradental* epithelial *débris* to form an epithelioma *adamantinum*, which penetrates the antrum or crowds out its walls (Malassez and Albarran); the third is engendered by the epithelium lining the antrum proper, and has its primordial seat in the interior of this cavity.

The first case reported is undoubtedly of the first variety, and began outside of the alveoli on the external surface of the jaw, developing without involving the antrum. The secondary disappearance of several alveoli and the partial excavation of the alveolar arch correspond with the clinical form described by Verneuil as epithelioma terebrans. I have had occasion to deal with this type of epithelioma, which is mainly differentiated by the seat of original development. Its rapid progress and almost certain recurrence, in my experience, in spite of most thorough surgical interference, is very discouraging from a prognostic stand-point.

In connection with the second case, the author remarks that the fibromata of the upper jaw, which are less frequent than those of the lower maxilla, may be grouped into: (1) fibroma originating in the mucous membrane of the antrum; (2) periosteal fibromata, which originate from the alveolo-dental periosteum; (3) fibrous odontomata, which belong to the embryoplastic period in dental formation; (4) medullary fibromas, which are *rare*, and which are born in the osseous tissue itself. He says: "As the palatine arch is the most resisting wall of the antrum, it may be affirmed that a tumor which projects and causes bulging of this surface into the mouth, without encroaching upon the floor of the orbit, has not its original seat in the antrum, but in the body of the bone or its periosteum."

From the stand-point of etiological diagnosis, the differentiation between fibrous odontoma and a medullary fibroma is interesting. If the tumor is encysted and enucleable, it is favorable to odontoma; it cannot be denied, however, that encysted fibromata of non-dental origin may exist. If the tumor appears after dentition is completed, it would be impossible to consider an odontoma probable,

unless we appeal to the possibility of a supernumerary germ, or, according to the age of patient and position of tumor, possibly from the elements destined to form the *dens sapientiæ.*

In the case reported the microscope reveals that the tumor is not a pure fibroma, but a fibrosarcoma of the myeloid type. The exact point from which these special tumors spring has been definitely located by Nélaton and by Follin and Duplay: "These encysted tumors of the jaw, which appear to be free from an intimate adherence to the osseous tissue, though they lack the encapsulating membrane of the odontomata, are about all specimens of the myeloid variety: they are myeloplaxomas. They develop in the spongy tissue of the bone, their favorite birthplace being in the upper jaw beside the alveolar arch, in a special mass of spongy tissue which is barely as large as a large pea, and almost constantly near the root of the second incisor, corresponding anteriorly to a point situated below and externally of the nasal fissure on the border of the incisor and canine fossæ, precisely in front of the antero-inferior angle of the maxillary sinus." (E. Nélaton.) When born at this point, the tumor may extend upward into the cavity of the sinus by displacing the posterior lamina of compact bone or by perforating it.

From a prognostic stand-point, the histology of these myeloplaxomatous sarcomas is important. It is natural to believe that recurrence and generalization will depend largely in the predominance of the myeloplaxes; when the fibrous element is dominant, the probabilities of recurrence are much diminished. Verneuil and Marchand deny the possibility of generalization in their growth, but the cases of Terrillon and Betz prove the contrary.

In an interesting report of a case of osteosarcoma of the lower jaw, in which the tumor was extirpated with half of the jaw (recovery), F. B. Jesset[22, July 30] remarks: "The case illustrates very briefly the importance of care and attention being bestowed on the teeth and gums, and the removal of all old stumps and decayed teeth that may have for years been causing constant irritation of the gums and alveolus. In this case, if these causes of irritation had been removed when first observed, no doubt the patient would never have had to lose half her jaw for a sarcomatous growth. And here I will take the opportunity of entering a strong protest against the habits of dentists in allowing stumps to remain in the

jaw, merely for the purpose of forming a better foundation for plates and artificial teeth. Such a practice cannot, in my opinion, be too strongly condemned, as these stumps are one of the most fruitful sources of sarcoma and epithelioma of the jaws. Apart from this, they, in the course of time, become loose and the plate no longer fits."

Chacon, of Mexico, [179] Jan. 15 contributes a carefully-written report of a case of sarcoma of the lower jaw, which was successfully removed by an intra-buccal linear osteotomy with Macewen's osteotome. The author concludes by emphasizing the necessity of considering the cosmetic result, even if in accomplishing it the operator is caused technical inconvenience.

Christopher Heath [6] Dec. 7, '99 reports that a case of myxosarcoma of the lower jaw, which had been previously operated upon five times for recurrence, had not had a return of the disease for four years since the last operation. Such a happy result is certainly rare. Two other cases are reported: one of central sarcoma of the lower jaw, successfully removed, with no recurrence seven months after operation; the other, a subperiosteal sarcoma, primary growth and three successive recurrences successively removed; death, seven months after first operation.

Another carefully-reported case of *sarcome à myeloplaxes* is contributed by Thibaudet. [220] Jan. 3 In this case the tumor began apparently in the spongy tissue of the alveolus. The left half of the lower jaw was removed; recovery from operation.

In a case of melanosarcoma of upper jaw, by Bernays, [786] Apr. the operation was successful. A mixed sarcoma of the upper jaw, in which the excised jaw is replaced by a movable artificial jaw, is described by Baudet. [188] May 11

Nasse, of Berlin, [41] Apr. 28 reported and demonstrated to the Nineteenth Congress of the German Surgical Society a rare central tumor which had developed in the jaw of a woman 41 years old, in the course of ten years. Skin and mucous membrane were intact. The preparation shows a tumor as large as a fist, surrounded by a thin shell of bone. Macroscopically examined, numerous cysts and cavities of the size of a pea or bean are recognized; microscopically, the posterior part of the tumor shows connective tissue rich in cells, as in fibrosarcoma, and great masses of epithelium; in the softer parts, epithelial neoplasms. Especially

important is the fact that the masses of epithelium are solid in the beginning, and have, besides, a cylinder epithelium; they resemble, therefore, the enamel organs of tooth development. In the normal lower jaw we always find remains of epithelium around the roots of the teeth. These paradental remains play an important histologic-anatomical part in the development of epithelial tumors of the lower jaw.

OPERATIONS ON JAWS.

Joseph D. Bryant, of New York, [1002 Feb.] contributes a notable and most instructive analysis of 254 cases of excision of the superior maxilla, collected from various sources. Of this number 2 only are the author's personal cases. In 230 of the 254 cases one jaw only was removed, leaving 24 in which both were excised simultaneously. The nature of the disease for which the operations were performed was largely of a malignant character. One hundred and eighty-eight of the 230 cases of removal of a single jaw recovered more or less promptly. Thirty-three, or about 14 per cent. of this entire number, died sooner or later from either the immediate results of the operation or from its complications and early *sequelæ*. Complete removals of a single jaw are found to have been followed by a death-rate five times greater than after incomplete removals. Primary hæmorrhage caused death in 9 cases, or about 4 per cent. of the entire number. Erysipelas, septicæmia, and other complications claimed their share of deaths. In 57 (66—9), or about 25 per cent., of the 230 cases, profuse hæmorrhage is reported to have taken place, coming about equally from the facial incisions and from the deeper parts of the wounds. The sources of this hæmorrhage were from recognized branches of the facial and internal maxillary arteries, as can be easily comprehended. In 13 instances, or about 5½ per cent. of the entire number, dangerous hæmorrhage is reported of a primary and secondary nature. It may not be uninteresting to note the fact that the left jaw was involved 110 times, and the right 74 times in the 230 cases. Of the remaining 46 the histories do not indicate the side involved. However, sufficient facts have been recited to suggest the interesting and probable circumstance that the left jaw appears to be more liable to disease than the right. More deaths are reported to have followed removal of the right than left maxilla. This is probably coincidental only.

In the 24 cases in which both upper jaws were removed simultaneously not a death is reported to have occurred as the direct result of the operation. This is a strange fact when it is recalled that 14 per cent. died from the immediate and consequent effect of the removal of a single jaw, but it is probably only a coincidence. Profuse hæmorrhage was present in only 6 of the 24 cases, and dangerous hæmorrhage happened but once.

Bryant submits the following conclusions: (1) that excision of the superior maxilla is not a dangerous operation; (2) that, contrary to general belief, excision of both superior maxillæ is not a specially dangerous procedure; (3) that, while dangerous hæmorrhage is not frequent in this operation, still its effects are to be feared more than any other result of the operation itself; (4) the removal of the upper jaw for the cure of bony and fibrous tumors and for the removal of naso-pharyngeal polypi is attended frequently with dangerous and fatal hæmorrhage; (5) the ligature of one or both *external* carotids is a commendable procedure, when dangerous hæmorrhage is apprehended as the result of operation on the area of their distribution; (6) that ligature of one or both of these arteries may delay or hinder the progress of a morbid growth, if it be developing in tumors supplied with blood by these vessels; (7) that, other things being equal, ligature of the common carotid for the purpose of controlling the circulation of the external is unwise, unsurgical, and unwarrantable; (8) that complete removals are five times as fatal as incomplete removals of single inferior maxillæ, irrespective of the nature of the disease and of the side removed.

Angel Pulido, of Madrid, corresponding editor, sends an abstract of a paper by E. Cervera, $\frac{907}{\text{Jan.}}$ in which he describes a *prothetic wire arch*, to be made in cases of partial resection of the lower jaw, in order to obviate the deformity, deviations, and annoyances which result after the resection of the jaw; it also prevents the falling back of the tongue, which is a serious source of peril in this operation, owing to the detachment of the muscles attached to the genial tubercles. The arch is very easily constructed and is of simple design, as shown in the figures on next page. The arch is made of nickel-plated steel wire, which is modeled to the configuration of the jaw. The arch is screw-tipped, so that it can be easily introduced to the depth of 2 centimetres or less into the

sawn surface of the bone. The arch was applied by Cervera in the case of a female patient with a central osteosarcoma of the body of the jaw. After the extirpation of the growth and body of the bone, two small perforations were made with Colin's drill to the depth of 1.5 centimetres into each of the sawn surfaces of the horizontal rami, in a direction perpendicular to the cut surface, and at a point 1 centimetre from the lower border of the maxilla. There was no difficulty in adjusting into these perforations the screw-tips of the arch.

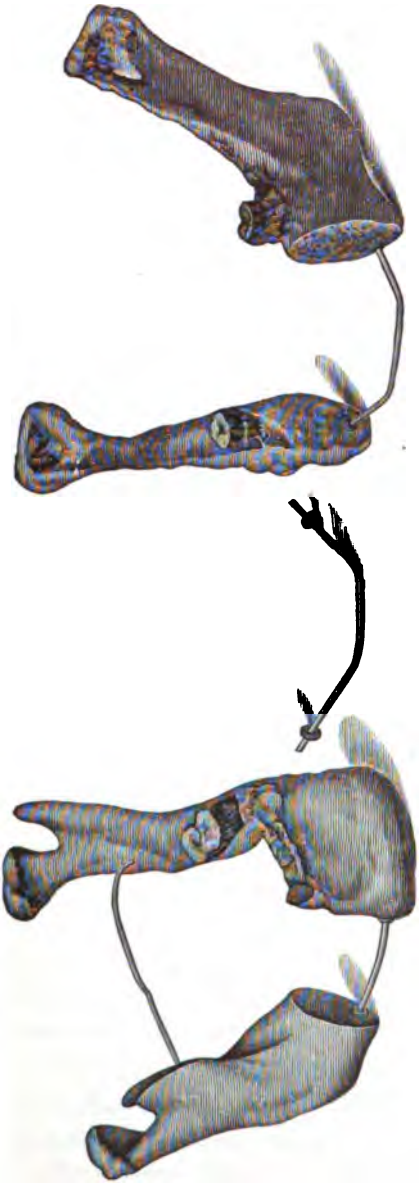


FIG. 12.—CERVERA'S PROTHETIC WIRE ARCH FOR PARTIAL RESECTION OF LOWER JAW. (*Revista Clinica de los Hospitales.*)

After the arch had been thus adjusted, he sutured, or rather reinserted, the tendinous portion of the genioglossi and the geniohyoidei to the central portion of the arch, using for this purpose four interrupted sutures. By this procedure the operator was able to dispense with the usual transfixion of the tongue with a thread, to keep it from falling back,—an attachment which usually has to be maintained for four or five days before it can be dispensed with. In Cervera's case healing was complete on the eighth day.

Notwithstanding the excellent result obtained in this first trial, the operator proposes to substitute an ivory arch for the present metallic material, this ivory being further covered by a layer of decalcified bone prepared from the tibia of the ox, hoping thereby to replace the original osseous loss by the substitution of a more suitable material.

Very similar is the apparatus independently, but *subsequently*, suggested by Guermonprez, of Lille, $^{3}_{Aug.98}$ who reports that in a case of epithelioma of the lower lip, involving the jaw, he endeavored to replace the excised bone by substituting a heavy silver wire passed through perforations drilled in the bone. Two perforations were made on each side, and two wires passed through and held in place by bending them over the external surface of the bone. The genio-hyoglossus and genio-hyoids were re-inserted by means of horse-hair sutures to the lower wire and thoroughly anchored. As can be readily understood, the wire was easily adapted to the shape of the symphysis. The immediate results were satisfactory; union of the external parts took place *per primum*. On the tenth day after the operation the prothetic wire jaw was removed. The tongue did not fall back, however, and there was no sign of suffocation. Still, since the lower lip was not sufficiently supported, and there was extensive dribbling of saliva, Guérin $^{3}_{Sept.11}$ stated to the French Academy that the apparatus was not a prothetic success. The idea is not a new one, since Verneuil, years ago, and long before him, Rigal (de Gaillac), proposed to replace this excised body of the jaw by an intermediary body. Martin's suggestions and experiments, referred to in the ANNUAL for 1890, are by far the most practical and ingenious application of prothetics to the surgery of the lower jaw, and are far superior to any of the methods here presented.

Orthopædic Resection of the Inferior Maxilla.—In a girl of 16, who since her birth had suffered with a deformity of the lower maxilla, Richelot $^{908}_{v.13,p.456}$ resected a piece 2 centimetres long, united the fragments with silver wire, but, in spite of healing by first intention, no bony union took place. Later on, Rouher succeeded in obtaining union by taking pins made fresh from the tibia of a calf and driving them into fragments which had been previously perforated for this purpose. The result, in regard to its functional and æsthetic aspect, was very satisfactory.

An interesting case of excision of the upper jaw for naso-pharyngeal polypi is described by George Thon.[6 July 12] Preliminary tracheotomy was performed, as dyspnœa was urgent (the subject being a male aged 35). The left upper jaw was removed, as the growth appeared at opening from the left side of base of skull. Chloroform was administered through the tracheotomy tube, and a sponge plugged the pharynx. Fergusson's incision was made. The tumor grew from the left pterygoid plate, and was completely removed, with bony attachments. It was of the size of a small Tangerine orange. Tracheotomy tube was removed four days after operation. On the ninth day the patient was discharged from hospital cured.

A case of excision of the superior maxilla with simultaneous ligation of the external carotid was reported by William Perrin Nicholson, Atlanta,[117 Aug.] in a female suffering with a tumor of one year's duration, growing rapidly during pregnancy. Shortly after confinement the carotid was ligated half an inch above bifurcation. The maxilla was removed without ligature of a single vessel.

William D. Hamilton, Columbus, Ohio,[61 Nov. 29] reports 5 successful cases of removal of the upper and lower jaws, which are classified as follows: 1. Adenosarcoma of lower jaw. Removal of left half of bone. Recovery. Operation September 30, 1888. Female, aged 27. 2. Osteosarcoma of right upper jaw. Discission. Recovery. Operation February 11, 1888. Male, aged 16. 3. Large, round-celled sarcoma of right upper jaw. Discission. Recovery. Operation March 2, 1889. Male, aged 55. 4. Sarcoma of left upper jaw. Discission. Recovery. Operation November 6, 1889. Female, aged 12. 5. Recurrent (myeloid or giant-celled) sarcoma of lower jaw. Discission, right half. Recovery. Operation November 30, 1889. Female, aged 36.

These cases, and 1 already reported,[1 May 10, '87] in which a large tumor and half of the lower jaw were excised, make 6 in all,—3 of the superior and 3 of the inferior maxilla. The author believes that a large proportion of these cases can be successfully handled without preliminary tracheotomy, and that the best way to *do* them is to get through with them as quickly as is compatible with thoroughness. All the patients are free from recurrences to date of report.

SALIVARY GLANDS.

Inflammation.—G. E. Wladimirow [21 No. 45] says that cases of primary inflammation of the salivary glands are rather rare, but such cases have been described by Löschner, Sottmann, Penzoldt, and Henoch. The author has observed in the St. Vladimir Hospital, Moscow, 3 cases of this affection, and briefly reports them. A moderate fever was noticed in all, the enlarged submaxillary gland was somewhat sensitive to pressure, and a diffuse swelling of the connective tissue was also noticed. These symptoms disappeared in three to five days. The third case is interesting because a brother of the patient, 6 years old, had become sick at the same time with double-sided parotitis. Thus, in the same house, the same cause produced in one case parotitis; in the other, an inflammation of the submaxillaries. The differential diagnosis of parotitis, the lymphadenitis of Tillaux, and sudden swelling of the submaxillaries consequent upon retention of saliva, is not difficult. The infection happens in cases of parotitis by means of Stenson's duct, in cases of the submaxillary by Wharton's duct, which is, however, less easily infected on account of its hidden situation and of the narrow opening, copiously wetted by saliva, and which is, besides, almost closed by the tongue during rest. The rare involvement of the submaxillary glands in stomatitis aphthosa and ulcerosa is thus explained.

Salivary Calculus.—An anomalous case of salivary calculus is reported by E. Owen, [6 July 12] which is interesting on account of the obscurity in the diagnosis. A swelling of the cheek existed which appeared to be removed by the excision of a neoplasm in the region of the duct through an intra-buccal incision. Some time after a mobile calculus was detected traveling in Stenson's duct, but it could not be readily exposed because it hid in an enlarged diverticulum. Finally, by an external incision which opened the duct, the calculus was extracted and the case cured. Rohrer [57 No. 3] records a calculus extracted from Wharton's duct which was as large as a nut. It simulated ranula. Malony [2 Oct. 26, '99] reports a case in which obstruction of Wharton's duct was caused by a fine salivary calculus which worked its way out and formed a cast of the duct. Hutchinson, Jr., [6 Mar. 22] showed, at the Hunterian Society, a small salivary calculus from a woman aged 35, who was sent into the hospital as a case of epithelioma of the side of the tongue. There was a hard mass,

and, as it was in the situation of Wharton's duct, he thought it might be due to a calculus, and on cutting into it he found it to be one. A hard fibrous structure of about ½ inch in thickness surrounded the calculus and the glands in the neck were enlarged.

Beatson[213 May] reports a case in which a specimen, elongated and oval in shape, measuring ¾ inch in length and $\frac{3}{16}$ inch in breadth and weighing 6 grains (0.4 gramme), was removed from the floor of the mouth, under the tongue, in a female aged 34. Its presence had been noticed for about eighteen months, and had given rise to the fear of cancer. Cuitellet presented to the *Société des Sciences Méd. de Lyons*[211 May 22] two enormous salivary calculi extracted by Poncet from a patient. The smallest weighed 1.50 grammes (23 grains), the other 3.40 grammes (52 grains). At the Medical Society of Hamburg, L. Benjamin[69 May 8] exhibited a salivary calculus removed from a patient suffering for fourteen days with a very painful tumor on the *frænulum linguæ*, which interfered with speaking and swallowing. After evacuating a large quantity of pus an incision revealed the presence of a calculus.

Foreign Bodies in Ducts.—Two curious and rare cases of impaction of Wharton's duct, produced by the penetration of a fish-bone into this canal, are reported,—one by Sandoz[197 Oct. 20] and the other by Hayward, of Liverpool.[2 Oct. 12, '99]

In Sandoz's case a young man, while taking soup, suddenly felt severe pain beneath his tongue on the left side. A small swelling instantly formed and the submaxillary gland enlarged. The pain subsided. Four months and a half later the painful symptoms recurred. Palpation revealed the presence of a hard body located in the situation of Wharton's duct; subsequently this hard substance was extracted, and found to be a fish-bone 3½ centimetres in length, and completely covered with salivary concretion. Recovery rapidly ensued. Hayward's case closely resembled the above and was relieved in the same way.

Salivary Fistula.—Delatour[159 June] reports a case of persistent salivary fistula following an injury to the parotid gland. The fistula was finally cured by curetting, caustics, and pressure.

Ranula.—Wölfler[113 Apr. 6] exhibited a child 9 months old with a *ranula glandulæ Nuhnii.* The tumor is about as large as a nut, situated sublingually, has increased very little, can be felt easily, is sharply defined, fluctuates, and is transparent. The whitish,

protoplasm-like contents contain plate epithelium. Dermoid cysts or a lymphangioma cysticum are eliminated by these symptoms.

An interesting and rare case of congenital ranula is reported by E. Flinn.[16 Oct.] The patient, male, aged 29, when admitted to the hospital presented a peculiar appearance. The mouth was wide open and he could articulate with difficulty. The tumor nearly filled the entire cavity of the mouth. It was pushed upward and far backward, and could hardly be felt with the tip of the finger; the growth also projected beneath the jaw into the myelo-hyoid space and assumed an elongated form. In this situation, being about 5 to 6 inches in length, it was hidden from view by the patient's beard and was as large as a good-sized orange; the projection into the cavity of the mouth began to cause inconvenience about eight months prior to admission, and since that time the patient experienced progressively increasing difficulty in feeding. There was a constant dribble of saliva and he was unable to lie down for fear of suffocation. The tumor, which presented distinct fluctuation, was aspirated several times; the first aspiration drew 15 ounces (443 cubic centimetres) of a creamy-like fluid. As it refilled rapidly, it was thoroughly emptied by submaxillary incision and drainage. In this case, a tumor under the tongue had been noticed by the parents when the patient was only one or two days old. It remained for many years small as a pea and only lately swelled to present dimensions. This type of dermoidal ranula is rare.

N. Muller read before the Moscow Medical Society a paper on ranula in newborn children, in which he states that in the foundling hospital at Moscow 4 or 5 cases of congenital ranula had been observed during a period of seven years in 80,000 children. Up to 1877 there were only two known instances of this affection on record[25 Dec.,'77]: one published by Dubois in 1833, and a second more recent case by Lombard. Bryant records 2 cases, probably congenital. Sir W. Ferguson recorded 1 case. Fairlie Clark[16 Nov.] observes that these tumors, while they are called ranula, are in reality usually dermoids. In the discussion that followed the reading of this paper before the Royal Academy of Ireland, W. Thornely Stokes exhibited the photograph of a girl aged 4 who had a similar tumor under the tongue. Drainage in the mouth proved ineffectual and a submaxillary incision was successfully resorted to.

A rare case of double acute ranula is reported by Carré.[6, Mar.] The author was called to attend a man who felt something suddenly form in his mouth which was nearly suffocating him. When he arrived he found the mouth occupied by two large oval swellings of a pale, pinkish color, with translucent walls; the tongue was displaced backward over the glottis, occasioning severe dyspnœa and complete inability to swallow. On the right side the swelling also presented below the angle of the jaw. The patient had just begun dinner, having previously been in excellent health, when his mouth suddenly filled up with the tumor below the tongue, and, rapidly increasing, pushed the tongue backward so that only the under surface of the tip was visible on examination. There was nothing in the diet to account for the symptoms, and no calculi or stenoses of Wharton's duct could be discovered. A free incision was made, which gave exit to 1½ ounces of a fluid (74 cubic centimetres) which resembled saliva. Relief promptly followed.

Malignant Disease of Salivary Glands.—Formad[112, Dec.,'89] reports a case of epithelioma of the salivary glands, with extension into the thoracic cavity by continuity of structure. At the autopsy the growth proved to have originated in the sublingual gland, extending to the submaxillary and parotid glands. It involved all the structures at the base of the tongue, extending around the larynx and pharynx to the soft palate, upward to the base of the skull, and penetrated the sphenoidal cells. It followed the œsophagus downward, infiltrating its serous coat, the post-mediastinal space, and extended all over the upper surface of the diaphragm. The growth presented a continuous chain of flat, nodular masses from the pharynx to the diaphragm, as stated. Another extension existed throughout the serous surfaces of the pleural cavity, without affecting the deeper structures beneath. Formad has studied 2 other cases of epithelioma of the salivary glands and one of the nasal glands, which, histologically, were identical with the neoplasm just described, but which did not show any tendency to generalization. They appeared like the common mixed tumors of the parotid, as more or less circumscribed nodular masses, with but limited peripheral infiltration. The extension of the neoplasm is more by continuity and contiguity of structure than by metastasis.

Formad has found pearly bodies to be a characteristic feature

of these new growths. True to their epiblastic progeny, the epithelial elements of the salivary glands appear to limit themselves to local tissue invasion, differing, histologically, from the cancers of the hypoblastic organs in forming pearly bodies throughout the growth, as do the epitheliomata of the epidermis. The only difference is that, while the pearly bodies of the latter may be very large, those of cancers of the epiblastic racemose glands (like the salivary) are very small.

Briquet, Lille, [220 Apr.] carefully describes that rare condition—primitive sarcoma of the submaxillary gland. The whole number of recorded cases only sum up to 14, according to the careful thesis of Jouliard.[1113 '99] According to Jouliard, there are no signs distinctive of cancer of the submaxillary glands; in some cases the progress of the disease is that of a benign growth, in others it is that of a malignant tumor of the typical sort; generalization or metastasis is rare. The diagnosis is most delicate; it is normally impossible to localize the trouble in the gland or to recognize its malignant nature in the beginning. From the anatomo-pathological stand-point, the recorded cases of malignant tumors of this gland may be distributed as follows: five carcinomata, three epitheliomata, six sarcomata. The evolution is usually slow in all. The diagnosis is usually made after the operation. Talazae taught that if a stylet was introduced into Wharton's duct the movements impressed upon the tumor would cause corresponding movements in the stylet, but the rarity of these cases would most probably not suggest to an operator this particular exploration, especially if the tumor had not projected below the buccal floor.

Operations on Salivary Fluids.—A case of adenosarcoma, weighing 90 grammes (3 ounces), was removed with parotid, in a young woman aged 27, by Ramon Martin Gil. [494 Dec.] No important vessel was ligated. The career of the case was uneventful. A more serious case is one of sarcoma of the parotid, reported by Wyeth, [196 Apr.] in a woman of 56 years. The external carotid was ligated and the internal jugular also required a lateral ligature. No other remarkable features are presented by the case.

GUMS.

At the International Dental Congress, Paris, Chauvin and Papata [805 Sept.] read a communication on inflammations of the gums,

their classification, therapeutics, and pathological consequences. The authors conclude that inflammations of the gums, except those of specific and toxic character, are always of traumatic origin; that the almost sole cause is the action of tartar, and that the gravity of the disease depends on the precise way in which this is deposited. Those forms of inflammation of the gums which are of slow progress, medium severity, or hardly noticeable are always produced by concentrated but regular and superficial deposits. On the contrary, inflammations of the gums which run a rapid course and present severe local symptoms have already for origin deeply-seated calculous deposits irregularly distributed over the cementum. This irregularity and the roughness which is its consequence explain the continuous irritation produced, the local abrasions of the gums, and the inflammation of the soft parts around the irritating foreign body, which is always observed in severe cases.

The authors also assert that toxic and specific inflammations of the gums are sooner manifest and are more severe when tartar is present, and the affection is more likely to pass from a chronic, almost unnoticeable inflammation into a more acute form. Moreover, in certain cases a patient would bear without inconvenience a dose of mercury which would develop toxic inflammation where a previous traumatic irritation of the gums existed; that inflammation of the gums may seriously affect the general health of the patient,—may even cause death; that the treatment must first be surgical, and include a thorough cleansing of the teeth, leaving not a particle of tartar to keep up irritation and inflammation; that the surgical therapeutics shall, if necessary, be destructive in character, by the use of a thermo- or galvano- cautery in fungous and hypertrophied states of the gums; that a physician consulted in a case of inflammation of the gums should, even if the inflammation be due to a constitutional cause or of toxic origin, secure for his patient the assistance of a dentist to facilitate, by local remedies, the effects of the general treatment; that the local treatment should always be antiseptic in character, because the continual traumatism results in sphacelus of the soft tissues, sometimes ostitis or necrosis, the decomposition of the tissues rendering the buccal cavity highly septic.

Arthur C. Hugenschmidt[805] read a paper on herpes zoster

of the mouth and gums, which he has observed in two instances. From these two observations of a comparatively rare location of this disease he draws the following conclusions:—

Herpes zoster, or zona, of the mouth presents itself with all the symptoms of a general disease. It is an inflammatory affection of one part and only one side of the buccal cavity, characterized by an eruption of herpetic vesicles, disposed in groups according to a regular direction. The eruption is preceded and accompanied by a neuralgic pain of the whole fifth nerve. The evolution of the disease may be divided into two periods: (1) the period of invasion; (2) the period of eruption.

1. The period of invasion begins by a rise of the temperature; there is fever; general symptoms then appear,—headache, nausea, loss of appetite, etc.; then an intense neuralgia of the whole region of the fifth nerve. The fever lasts three days, and is followed by the period of eruption.

2. In the period of eruption the parts to be involved become excessively painful to the touch; the mucous membrane is red and presents a series of little herpetic vesicles, disposed in groups and having the size of a pin's head; some of them are united; they assume a regular direction, usually the course of the nerve (in the first case it ran along the course of the buccal branch of the inferior maxillary nerve, and in the second case also along a filament of the same nerve). No vesicles are to be found disseminated in the mouth. The neuralgia, which is general for the first three days, localizes itself as soon as the eruption occurs.

The local lesions are attributed to trophic changes, due to a neuritis of the nerve supplying the involved parts. The only two diseases of the mouth for which it may be mistaken (and then only in the early stage, for later, when the eruption is complete, no confusion is possible) are herpetic stomatitis and aphthous stomatitis.

With herpetic stomatitis we usually have herpetic angina; moreover, the herpetic vesicles are disseminated irregularly on both sides of the buccal cavity; in zona only one side is involved. Aphthous stomatitis, described by Charles David, at the International Congress of Washington, also presents with fever, but the local pains are disseminated and no neuralgia is present.

Pyorrhœa Alveolaris.—The infectious arthrodental gingivitis is studied by Gallippe, of Paris.[13] This chronic suppurative

disease, associated with the dental alveoli, has, since its causes are not distinctly known, received different names. Gallippe, in this work, proposes a new name. That the disease is infectious he believes is true, because the teeth, which become loose, contain fungi in the small canals of the dentine. Two such isolated kinds of fungi produced, when injected beneath the skin of guinea-pigs, abscesses in the bone, the liver, and the subcutaneous cellular tissue. The injection into the gum itself did not produce the specific affection. Arthrodental inflammation is the new name preferred by Gallippe for this old trouble. The disease appears in healthy persons, but especially in syphilitic, scrofulous, diabetic, and ataxic persons, these constitutional conditions preparing the soil for the infection. David [363 Mar. 9, '90] calls the same affection Fauchard's disease, reminding us that Fauchard had described it distinctly one hundred and fifty years ago, and that its real nature is not yet known enough to give it a name resting upon a pathologico-anatomical basis. [13 Aug. 15]

The whole question of the nature and treatment of pyorrhœa alveolaris, as it is more familiarly designated in English-speaking countries, has been summed up by Magitot, [100 Aug. 14] at the Tenth International Congress, Berlin, who reaches the conclusion that this disease essentially consists in a true articular and ligamentous affection, and should be called *alveolar arthritis.* The addition of the word "symptomatic" is in accordance with the fact that it is usually associated with constitutional conditions which predispose the alveoli toward its development. This is especially the case with the rheumatic diathesis, diabetes, albuminuria, hepatic, mucous, and cutaneous diseases, etc.; also syphilis, rickets, and other diatheses, of which this alveolar arthritis is often the only manifestation. In adopting the term arthritis, Magitot accepts the researches of the modern school of anatomists, Owen, Tomes, Ranvier, and Malassez. He also abandons his former views on the periosteal nature of the intra-alveolar tissues, and with this change of base also gives up the name of osteo-periostitis, which he applied to the disease in 1867. He accepts the recent investigations of Gallippe and Vignal, which establish the microbial and infectious pathology of this condition. In regard to the treatment, Magitot has modified his opinion in accordance with the new light, and formulates the therapeutics as follows: (1) the exhibition of

local antiseptics, especially the mercurial bichloride; (2) the application of the thermo- or galvano- cautery to combat the arthritic element; (3) the treatment of the underlying constitutional disorders which so markedly predispose toward the development of the local trouble.

In a practical paper on pyorrhœa alveolaris, C. B. Atkinson, of New York, [805 July] says: "A dark-blue color of swelled or spongy gums should be treated by lancing to relieve the venous congestion, and then injected with aromatic sulphuric acid, full officinal strength. Should suppuration be imminent or present, evacuation of the pus by incision or the injection of hydrogen peroxide is a first step, followed by a delicate application of caustic paste (potassa fusa $\frac{2}{3}$ and carbol. cryst. $\frac{1}{3}$). A cherry-red color of slightly-puffed gum calls for salicylic-acid solution saturated in 95-per-cent. alcohol. A warm, pink color and no increase in size indicate tannic acid, made into a thick paste with glycerin. The constant exhibition of antiseptic and stimulant mouth-washes is a necessity, and their daily use should be insisted on. The following washes have been commended:—

℞ Hydrarg. bichlor.,	. . . .	gr. ij (0.13 gramme).
Tinct. calendulæ,	. . . .	ʒiv (16.00 grammes).
Aq. dest.,	. . . . q.s. ad	℥viij (249.00 grammes).
M. Sig.: As directed.		

℞ Hydronaphthol.,	. . . . .	ʒij (8.00 grammes).
Tinct. calendulæ,	. . . . .	ʒiv (16.00 grammes).
Aq. dest.,	. . . . q.s. ad	℥viij (249.00 grammes).
M. Sig.: As directed.		

℞ Hydrogen peroxid.,	. . . . .	℥iv (124.00 grammes).
Tinct. calend.,	. . . . .	ʒij (8.00 grammes).
M. Sig.: As directed.		

The hydronaphthol is especially recommended. A general treatment to meet constitutional conditions is not to be forgotten.

The mechanical means indicated are to *fix and immobilize the teeth, to prevent irregularities and elongation.* This may be secured by striking copper caps, made continuous and embracing all of the affected teeth, extending from the occluding surface of the crowns well up in their lingual or buccal surface, as the case may be; but the fixture should be in one piece, extending from firm tooth to firm tooth. Ritter [804 Jan. 1, '98] speaks of the inflammation of the mucous membrane of the mouth and pharynx, and especially of

the lower jaw, in the eruption of the lower wisdom-tooth. He considers the prognosis favorable, if the inflammation is not caused by cramping of the wisdom-tooth for want of growing space. It suffices, then, to cap the molars with caoutchouc, so that the upper wisdom-tooth in biting cannot meet and injure the gum covering the lower wisdom-tooth. If there is want of space the penetrating tooth must be extracted with a right-angled resection forceps. [18 Aug.15]

Nicolas reports a case of *fistula of the gum* which opened in the mamma. [804 Dec.,'88] A lady 32 years of age had had for eight months a purulent sinus, 1 centimetre above the left nipple, which no treatment could stop. Accidentally treating the teeth, the first lower, very hollow molar was stopped up with iodoform, upon which the flow over the nipple smelt of iodoform. The suspicion that the tooth was the cause of the fistula became a certainty when a cochineal solution injected into the tooth colored the flow from the mammary fistula. The tooth was now extracted, and within twelve days the fistula healed.

EPULIS, AND DENTAL DISORDERS.

W. B. Rogers, of Memphis, [849 April] briefly but interestingly discusses the subject of epulis, and presents a report of 5 cases of this disease which came under his observation. He evidently sympathizes with those surgeons who regard epulis a recurring tumor of malignant character and tending to destroy life, as he says: "Strange to say, those writers who dwell on the non-malignant tendency of epulis consent to the same histological characters as are claimed for it by those of opposing creed; and it seems to be definitely settled that epulis belongs to the sarcomatous group. It is a myeloid sarcoma, composed of fibrous tissue and myeloid cells, the former predominating, and it would appear occasionally to exist almost to the exclusion of the latter, and *vice versâ*. The greater the preponderance of myeloid cells, the greater the tendency to malignancy. Histologically, epulis is a recurring malignant tumor,—a sarcoma. Clinically, early removal means a cure. When neglected the tendency is to destroy life."

M. H. Richardson, of Boston, [99 Oct.1] reported a small tumor of the upper jaw, which gave rise, in the Boston Society for Medical Advancement, to some instructive discussion on the operative treatment. Richardson contended that in no class of tumor is the

advantage of a thorough dissection more apparent. "I recall at least 4 cases of epulis, operated upon by myself during the past year, in all of which an attempt had been made to remove the growth without sacrificing the teeth, and in all there was prompt recurrence. Thus far the prompt removal, after drawing the teeth from whose base the tumor had sprung, had been effectual, and was likely to continue so. In all cases of tumor of this kind removed at the hospital from 1878 to 1888, that I was able to follow, there had been neither recurrence nor death. It does not follow that it will be necessary to remove the teeth in all cases. Where the growth appears on both sides of the alveolar process, at least one of the teeth, and often both, must be drawn to give free access to the periosteum. In this disease the dangers of palliative delay are not great, on account of the fact that it has, in the beginning, at least, only local malignancy." In the course of the discussion, Stedman said that he had occasion to observe in pregnant women tumors of the gums, with appearances almost identical with epulis, bleeding at the touch, and yet disappearing on delivery of the child. W. L. Richardson confirmed Stedman's experience.

F. D. Rodriguez, of Havana, $^{450}_{\text{Oct.}}$ reports 2 cases of epulis, and gives the following practical conclusions from his observations: 1. That in none of his cases of epulis has he observed evidences of general or secondary invasion, and that it has been sufficient to remove the tumor and to extract the roots or teeth with which they were connected to cause the arrest of the disease. In not one of the numerous cases that have come under his observation has he known of recurrence. 2. In all cases which he has treated there has been a great neglect of the hygiene of the mouth. This has been the case especially with individuals working in copper, or cutlers, whose teeth accumulate a characteristic tartar which appears to predispose them especially to these neoplastic formations.

I. Hutchinson, Jr., $^{6}_{\text{Apr.5}}$ showed figures and microscopic preparations from a case of myeloid epulis, typical of myeloid sarcoma, with giant-cells. Nodules of bone were observed in the slide. It was said that these tumors did not ossify, but he had found the reverse to be the case. The plum color of the tumor was very characteristic. A case of epithelial epulis in a woman aged 58, and successfully treated by partial excision of superior maxilla, is reported by Malloch. $^{39}_{\text{Apr.}}$

Necrosed Teeth.—W. P. Beach [157 July] describes a case under his immediate observation for the past ten years, and illustrating very forcibly at least one of the dangers of retaining necrosed teeth in their sockets. About nine years ago the second bicuspid of the right upper jaw contained a cavity which was filled with amalgam and shortly afterward began to ache severely. He insisted on having the filling removed and the nerve killed, which was done. A few months later the tooth died and blackened, and a sinus opened through the gingival mucous membrane in the region of the root of the tooth. This state of affairs continued about two years, when a series of small abscesses occurred on the right pinna, which lasted for about one month and numbered ten or twelve in all. He recovered from the attack and was tolerably comfortable for a few months, when the same experience was gone through with, but this seizure was more prolonged and severe; there were marked constitutional symptoms, and a large abscess made its appearance in the right temporal region. These attacks returned at intervals of a few weeks or months for several years, each one being slightly severer than the last, and finally involved the scalp of the right side. About this time a large abscess made its appearance on the knuckle of the little finger of the left hand, and the man commenced to show signs of marked reduction of health and strength. Beach further noticed that the vent in the mucous membrane closed, and that shortly after such closure the abscesses made their appearance. At last it was decided to have the tooth extracted, which was done nearly a year ago, and since that time the patient has been in perfect health. The root of the tooth was very much softened and roughened, while the tooth-socket and tissues surrounding it were quite sensitive to pressure. In Beach's opinion this was a case of septicæmia, the result of pent-up pus in the neighborhood of the dead root.

Dental Irregularities.—Talbot, of Chicago, [1139 Jan.] regards as fallacious the following conclusions on this subject: 1. A high, contracted vault results from thumb-sucking. 2. That dental irregularities are produced by a force originating in the sphenoid bone and acting upon the intermaxillary bones.

Tooth-Cysts.—Parreidt [804 Nov., '89] states that tooth-cysts sometimes undergo such changes that the so-called parchment-crackling is often wanting. Such cysts can be considered as chronic central

abscesses of the jaw, of which he gives several examples. In one case it was doubtful whether there was a sarcoma, odontoma, or a cyst. In regard to the etiology, Parreidt points to traumatic influences which especially give rise to the production of follicular cysts. The cure of periosteal tooth-cysts results sometimes spontaneously after extraction of the affected tooth. Dieck [804] Mar., '99 describes a cyst produced by an abnormally situated normal tooth. A girl of 13 years old had a large swelling on the right side of the alveolar process on the lower jaw, corresponding with the yet firmly-planted second deciduous molar. It was discovered after extraction of this tooth that the corresponding normal molar lay obliquely in a spacious bone-cavity underneath it, so that the chewing surface was turned toward the face. The cavity was lined by a solid membrane of connective tissue, which was removed.

Extraction of Teeth.—Nothing new has been contributed on the *technique* of this operation. Scheff [910] Oct. 4, '99 says he succeeded, in 3 hæmophilic subjects, in stopping the bleeding by injections of hot water.

Pillin [842] relates 5 cases occurring in his practice of secondary hæmorrhage following tooth extraction. Three of the patients were members of the same family, but it is not mentioned whether there was any history of hæmorrhagic diathesis. The cases are interesting on account of the length of time elapsing between the operation and the hæmorrhage. The first, a man aged 28, had profuse bleeding, commencing on the fifth day; a brother, aged 31, notwithstanding that the sockets were plugged immediately after the extraction, bled on the eighth day. Of the two other cases, hæmorrhage occurred on the third and fifth days respectively. The treatment successfully adopted was plugging the sockets with cotton-wool saturated with tincture of perchloride of iron, and fitting over this a plate made of Stent's composition, lined with a mixture of tannin and gum tragacanth. Stent's composition is a preparation used by dentists for making models of the mouth. It is harder than wax at the temperature of the body, and not so flexible as gutta-percha, and therefore makes an accurately-fitting and easily-applied plug, and can be readily retained in position by keeping the jaws in contact by an ordinary four-tailed bandage.

The treatment of the wound requires, as a rule, no special attention; yet there are particular cases in which an after-treatment

is necessary, and it is always wise to proceed antiseptically in the operation. McPherson, $\frac{1}{Nov.22}$ dwelling on the importance of prompt treatment in alveolar abscess, urges that the proper treatment in these cases, when the attack cannot be aborted in its early stages, is the extraction of the affected tooth. H. C. Quimby, Liverpool, $\frac{6}{Dec.22,'99}$ argues in favor of the conservative treatment of the painful diseases of the teeth, and offers a striking contrast to the aggressive attitude assumed by McPherson.

Antiseptics.—Miller, of Berlin, $\frac{805}{Aug.}$ contributes a communication on experiments on the comparative value of various antiseptics in the treatment of diseased teeth. The antiseptics which he has thus far experimented with are arranged in the following classes: 1. Those pre-eminently active in preventing decomposition of pulp-tissue: bichloride of mercury, cyanide of mercury (?), bichlorphenol, sulphate of copper, phenol (carbolic acid), oil of cloves, chloride of zinc, campho-phénique (?), hydronaphthol (?). 2. Those of doubtful value: thymol, salicylic acid, eugenol, A- and β-naphthol, acetic tartrate of aluminium, 5-per-cent. solution of bichloride of mercury, and possibly some essential oils. 3. Those nearly or quite worthless: iodoform, basic aniline, coloring matters, borax, boracic acid, chloride of lime, peroxide of hydrogen, sozoiodol salts, iodol, tincture of iodine, spirits of camphor, naphthaline, the double cyanide of mercury and zinc, and many essential oils. Resorcin, thallin, sulpho-carbolate of zinc, oil of birch, iodide of sodium, nitrate of sodium, and some other substances have not yet been sufficiently tested to permit of an estimate of their value, though some of them seem to promise well. Miller calls attention, also, to the instability of antiseptic compounds, and shows that it is a fallacy to believe that an antiseptic placed in the cavity of a tooth or in a root-canal, and sealed with a water-tight substance, remains unchanged or retains its antiseptic action indefinitely.

Miller $\frac{805}{Apr.}$ contributes a short paper on the action of hydrogen peroxide upon the teeth. He refers to W. H. Rollins, who first called attention to the fact that the enamel of the teeth loses its polish under the action of peroxide of hydrogen. The intense and solvent action noticed by Rollins was probably due to the fact that he used the technical and not the medicinal preparation of the peroxide, the first exhibiting strong acid reaction,—as much as 3 per cent., of hydrochloric acid, according to Miller,—who concludes

that there seems to be no room for doubt that neutral, or nearly neutral, solutions of peroxide of hydrogen act upon dentine by destroying or dissolving the organic matter by which the lime-salts are liberated or their bond of union destroyed. At all events, the agent in question should be used with some caution, and when applied repeatedly, or when used as a mouth-wash, as suggested by Busch, the necks of the teeth should be particularly watched and the use discontinued in case the disintegration begins to show itself.

H. E. Vaughan, Springville, N. Y., $^{805}_{\text{Apr.}}$ endeavors to prove that sodium silico-fluoride is, when properly used, capable of becoming one of the most useful salts in the dental pharmacopœia. As a disinfectant it has been shown to be powerful enough to markedly antagonize the germs of putrefaction; as a coagulant, to be non-escharotic; as a *deodorant*, strong enough to destroy the most penetrating of putrefactive odors; as a stimulant, strong enough in full solution to cause new tissue to form, and yet not act as an irritant to surrounding tissue. It is practically unchangeable, the only change being that noted regarding solubility, which is not of the slightest practical importance.

ANÆSTHETICS IN DENTAL PRACTICE.

The past year has been prolific in papers and discussions on local and general anæsthetics in dental practice. Cocaine has particularly claimed a large share of attention. It can now be safely stated that the proper status of cocaine as a dental anæsthetic has been thoroughly established.

Bleichsteimer $^{1140}_{\text{Sept.,'89}}$ recommends, for antiseptic purposes, that the solution of muriate of cocaine be made with $\frac{1}{5000}$ solution of mercuric chloride. The action of the injections is not so favorable when the injection is made in a hyperæmic or tumefied gum. The anæsthesia usually lasts about ten minutes. A 5-per-cent. solution of cocaine is quite sufficient. As a general rule, not more than 5 centigrammes (1 grain) should be injected at one time. If half an hour is allowed to elapse between the injections, the dose can be carried to 15 centigrammes (3 grains). One should make several punctures, and inject the slightest quantity of cocaine in each puncture. Extraction should follow the injections as soon as possible. If one has several operations to perform, he should

not introduce the needle in the neighborhood of the wounds produced by the previous extractions, so as to prevent a too rapid absorption of the drug. In case a collapse should occur, the patient should be immediately placed in a horizontal position, alcohol or wine given internally, and nitrite of amyl by inhalation. In cases of hysterical attacks it is well to give an injection of 10 drops of a 10-per-cent. watery solution of aqueous extract of opium.

Poinsot, $\frac{1140}{\text{Sept.,'99}}$ Paris, made a communication on the injection into the gum of pure cocaine. The formula recommended by the author is:—

℞ Oleonaphthine (liquid vaseline),		
Arachis-oil, ...	āā	50 centigrammes (7½ grains).
Pure cocaine, ...		5 centigrammes (¾ grain).

By the use of liquid vaseline the author finds that he is able to localize the action of cocaine at the point of injection, or, at the utmost, in the parts immediately surrounding it, and to prevent in this manner its general action, except in very rare cases. It also prevents a sphacelus or necrosis of the alveolar borders. It is important to inject with the greatest care. With the formula recommended above it is necessary to dissolve the cocaine by placing it in a little hot-water bath. The needle of the syringe should be as short as possible and of the smallest diameter, and it and the part of the gum where the injection is to be made should be washed with absolute alcohol. The injections must be made very slowly, and a number of them are to be made around teeth which have multiple roots. We may know when the gums are sufficiently injected by their bleached appearance. To obtain complete anæsthesia, we must wait from four to eight minutes after the injection has been made. We can find whether the anæsthesia is complete by cutting the gum around the tooth with a lancet, or by touching the same with a red-hot iron. Cocaine should not be used in cases of hæmophilia. It is also well only to operate on one tooth at a time, and not to extract several at the same sitting. If unpleasant symptoms occur, ammonia is to be given by inhalation. Later, we may give 6 or 8 drops of laudanum in a cup of strong black coffee, without sugar. Local anæsthesia is more complete when the injection has been made in thick tissues in a physiological state. It is much less complete when the mucous membrane is thin and in a chronic pathological condition. The teeth of the superior

maxillæ are extracted with much greater success as regards sensibility than those of the inferior, especially the lower molar and wisdom teeth. This is the result of an experience of nearly 2000 cases in which this method has been used.

Richard Chauvin [1140 Sept.] stated that, notwithstanding the researches of Libermann and Geissel, who both experimented with cocaine obtained by synthesis, or with cocaine purified by other processes, one must always use this drug with great caution. The accidents which are observed by the use of these chemically-pure preparations are of an exclusively nervous kind. As by the purification of cocaine the toxic alkaloids, ecgonine, isatropic cocaine, which are cardiac poisons, are eliminated, there is no reason to be surprised by the disappearance of the cardiac toxic symptoms. The author also thinks that it is indifferent whether cocaine be administered in the form of a salt, such as the muriate of cocaine, which is soluble in water, or the alkaloid cocaine itself, which is soluble only in a 2-per-cent. quantity in oleonaphthine or liquid vaseline, provided the product is a chemically-pure one. The best means of preventing accidents is to introduce the hypodermatic solution very slowly, and to give only moderate doses,—not more than $\frac{1}{2}$ grain (0.03 gramme); and, if trouble is anticipated from the nervous condition of the patient, it is better to take about five minutes to introduce the whole quantity of the solution,—that is, about $\frac{1}{10}$ grain (0.006 gramme) every minute. In this manner the injection may be continued as soon as the first toxic symptoms appear, while the local anæsthesia is at the same time more complete. With pure products, if the nervous symptoms are not thus completely prevented, they are very much diminished.

Arthur C. Hugenschmidt [1140 Sept.,'99] divides the accidents of cocaine under two classes: (1) local; (2) general. Local accidents (molecular necrosis of the tissues or necrosis of the alveolus) can be prevented by washing with an antiseptic solution (bichloride, $\frac{1}{1000}$) the parts to be operated upon a few minutes before the injection. The solution must not be over two or three days old, and in preparing it even the distilled water should be boiled for at least five minutes before being used. General accidents observed are of cardiac, respiratory, nervous, and calorific origin.

Schlenker [1115 p.302,'99] had, of 297 cases in which cocaine was used, 3 per cent. of violent and 5 per cent. of mild cases of poisoning. He

injects mostly 0.05 gramme ($\frac{2}{25}$ grain) of cocaine; if injection is employed again in the same person later on, larger doses, 0.07 to 0.1 gramme (1 to $1\frac{7}{10}$ grains) are given, because by repeated use, even if one year has passed, larger doses may be borne. The after-pains, which frequently appear after extractions in periostitis, are not observed when cocaine has been previously used.

In a paper on local anæsthesia by nitrous-oxide gas, G. L. Curtis, Syracuse, New York,[808 July] suggests that a blast of nitrous-oxide gas, under high pressure, thrown upon a tooth or tooth-pulp, has the effect of producing local anæsthesia by depriving the tissues of moisture, and thus rendering them insensible to pain. The pressure of the gas in the cylinder in which it is supplied in a liquefied state is, at ordinary temperatures, about 1000 pounds to the square inch; that is, when the cylinder is full. This is ample for the purpose. Dunogier, of Bergerac, France,[1140 Sept.,'89] says that some drugs have a powerful action on the fifth nerve, so that in certain cases their action is very precise, giving relief in a few hours to pain which might have lasted several days and necessitated finally the extraction of the painful tooth or the destruction of its pulp. In his practice, whenever the local treatment appears insufficient after repeated trials, he gives the following preparation:—

℞ Aconitine, crystallized, . . .	$\frac{1}{4}$ milligramme	($\frac{1}{250}$ grain).
Gelsemine, ...	1 milligramme	($\frac{1}{65}$ grain).
Valerianate of quinine, . . .	5 centigrammes	($\frac{3}{4}$ grain).

For one pill.
One to three pills for an adult in the twenty-four hours.

As local anæsthesia has its decided limitations, and cocaine is often unreliable and is contra-indicated in even the simplest cases, it is natural that the general anæsthetics should still be watched and studied with careful solicitude. Nitrous oxide, of course, dominates the field in all countries, but it is to be noticed that the mixtures of nitrous-oxide gas with oxygen (noticed in the last ANNUAL) and the bromide of ethyl are being tentatively tried in England and Germany.

DENTAL REFLEXES.

The anatomical relations of the dental nerve-supply in its relation to dental reflexes is minutely and clearly presented by M. Macnaughton Jones,[912 Aug.] and the ocular, nasal, and aural perturbations that may arise from dental irritation are carefully

considered and explained. The reflex affections which occur during difficult dentition in children, such as general convulsions, reflex bronchial irritation, diarrhœa, epidermal eruptions, strabismus, paralysis, trismus dentium, tinnitus aurium, and dental headache, are more prominently noticed. The case which prompted this contribution is an example of a reflex irritation from affection of the teeth, which has hardly received that consideration which the importance and frequency of the relationship demands. Lauder Brunton [408] drew special attention to those forms of headache which are dependent upon disorders of the eyes and teeth, as well as those which are due to disorders of digestion. His attention was attracted to the relation of headache and carious teeth by his discovery of its occurrence in his own person, finding a commencing caries in the last molar tooth on the same side as the cause of the headache. "Not infrequently," he says, "when I have pointed to a decayed molar as the origin of the headache, the patient has said, 'But I have no pain in the tooth;' and to this I usually answer, 'It is quite natural; you get the toothache in another part of your head.'" Brunton has noticed as the special seat the temporal and occipital regions. This location he attributes to an affection of the vasomotor branches of the temporal and those of the occipital artery through the sympathetic system, a vascular spasm causing pain in the head. He has noticed a tenderness in the scalp over the affected region, and this Jones has verified. Brunton says that a decayed molar in the lower jaw usually causes temporal headache rather farther forward than that caused by the lower jaw. Caries of the incisors, of eye-teeth, is more likely to cause frontal or vertical headache. There is one strong clinical feature which assists in the differentiation between ocular and dental headache, viz., the frequent occurrence of megrim in the former and its absence in the latter.

As a result of my personal observation, I would say that the occipital headache is always more likely to be seated in the side of the head corresponding to the irritating tooth.

A case of closure of the jaws from spastic irritation of the masseter, due to irritation of an unerupted wisdom-tooth, is reported by Pennock, of Victoria, Australia. [267] Nov. 15, '99 The masseteric contracture was relieved after removal of the wisdom-tooth. Excessive expansion of the fangs was the cause of the irritation, the angle being 30°.

MISCELLANEOUS.

Among the general reviews and lectures which are reproduced in the periodical press during the past year, and which, though presenting nothing particularly new, might interest the readers of this section, we would mention an address "On the Dangers Arising from Syphilis in the Practice of Dentistry," by L. Duncan Buckley [808 Aug.]; "What is the Reason of the Great Increase in the Decay of the Teeth of the Rising Generation?"

PÉAN'S CASE OF RESECTION OF THE BONES OF THE FACE, BEFORE OPERATION.
(*Gazette des Hôpitaux.*)

by Kirby [6 Aug.16]; "The Care of the Teeth in Childhood," by F. Fox [6 Nov.1]; the chairman's address to the Section of Oral and Dental Surgery of the American Medical Association, [61 May 21] by Jacob L. Williams; "Nasal Obstruction and Mouth-Breathing as Factors in the Etiology of Disorders of the Teeth," by Scanes Spicer [6 Jan.18]; "The Changes in the Teeth Due to Constitutional Causes," by G. M. Brousseau [64 Mar.]; "Relation of Tropho-Neuroses to Diseases of the Mouth and Jaws, with Special Reference to Syph-

ilitic Necrosis," by G. Frank Lydston [805 Aug.]; "Clinical Conditions Common to the Throat, Mouth, Nose, and Ears," by Harrison Allen [805 May]; "Studies on the Anatomy and Pathology of the Tusks of the Elephant," by W. D. Miller, Berlin [805 Sept.]; "Diseases Incident to the First Dentition," by James W. White. [805 Nov.]

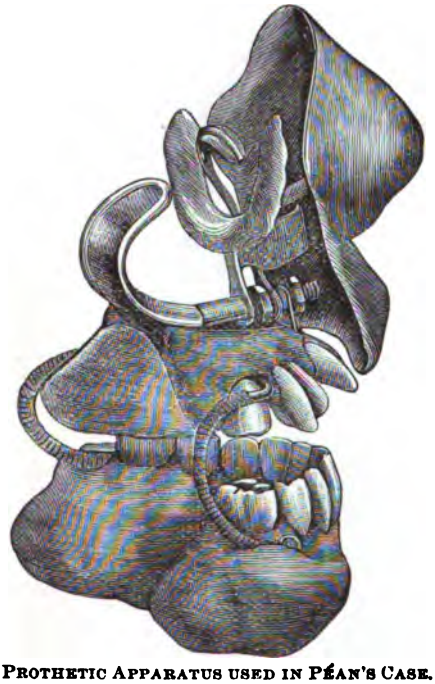
SURGERY OF THE FACE.

Péan's [100 Jan.16] case of resection of the bones of the face is well

PÉAN'S CASE, AFTER OPERATION.
(*Gazette des Hôpitaux.*)

illustrated by the accompanying cuts. The sphenoid, the three maxillaries, and the malars were the seat of osteo-fibromata following dental heteroplasia. The patient, a female aged 32, dated the beginning of the trouble from the age of 9 years. In 1884 the right superior maxillary was removed, but the disease recurred in a short time and involved the left upper jaw. When the patient was first seen by Péan, in November, 1888, her face pre-

sented a truly horrible appearance. The superior maxillary on the left side was much enlarged, and of the size of a fœtal head. The inferior maxillary was also greatly enlarged; the cheeks, eyelids, and nose were pushed inward, and the orbital, buccal, and nasal cavities were almost completely closed. The alveolar arches were thickened, and the teeth were loose. Mastication, deglutition, phonation, and vision were greatly interfered with, and severe pain was present. Owing to the extensive involvement of the bones of the face, it was thought necessary to remove the maxillaries, the malars, and a portion of the sphenoid. Inasmuch as no operation of this kind had been recorded in the literature of surgery, and the patient was extremely feeble, much doubt was felt as to the outcome of the procedure, which was undertaken only at the earnest solicitation of the patient. At the first operation, which was performed on December 14, 1888, Péan exposed the upper jaw by a median incision through the upper lip and nose, hæmorrhage from the labial and nasal vessels being controlled by the application of forceps. The buccal mucous membrane was then detached with bistoury and scissors, the tumors exposed, and the prominent portions excised with a strong, short bistoury, the remaining portions and the bone being removed piecemeal with gouge-forceps. In this manner the superior maxillary, the malars, the pterygoid processes of the sphenoid, the naso-orbital septum, and the floor of the orbit were excised. It was then seen that the upper portion of the tumor involved the compact inferior lamella of the sphenoid, which was also removed, and, much to his astonishment, the author found a small molar tooth lodged in the spongy tissue of the sphenoid.



PROTHETIC APPARATUS USED IN PÉAN'S CASE.
(*Gazette des Hôpitaux.*)

It is reasonable to suppose that this tooth was the cause of the neoplasm. The presence of such an anomaly is probably without parallel in man, although not infrequent in some animals, notably the horse.

At a second sitting, which occurred six weeks later, Péan removed the lower jaw by an incision extending from one angle to the other, at the level of the inferior border. The periosteum was stripped off, the tumors excised on both sides, and the rami resected with the osteotome. In the symphysis a canine tooth of the second dentition was found, which was probably the cause of

BLAIR'S CASE OF CICATRICIAL DEFORMITY FROM GANGRENE OF CHEEK, WITHOUT PROTHESIS.

BLAIR'S CASE WEARING PROTHETIC APPARATUS (ARTIFICIAL CHEEK).

(*International Dental Journal.*)

the second tumor. The presence of this anomaly is the more surprising, inasmuch as all the teeth of the lower jaw were complete. The result of the operation was good, the wounds healed by primary union, and no recurrence had taken place in fourteen months. It is a well-known fact that these tumors, if completely removed, show no tendency to return, even when, as in this case, they contain sarcomatous elements. To correct the deformity, Michaels, a dental surgeon, constructed an ingenious apparatus, consisting of an artificial upper jaw, nose, and lower jaw, so that the patient was enabled to speak and swallow without difficulty.

An interesting case of facial deformity corrected by prothetic apparatus is reported by L. P. Blair.[808 Sept.] The patient, a female aged 26, had a gap in her face extending from median line of lips to angle of mouth, thence upward to level of infra-orbital foramen and downward to level of myelo-hyoid ridge of lower jaw. The appearance is shown in figure. The cause appears to have been gangrenous stomatitis induced by mercurialism in the course of typhoid pneumonia, in childhood. Two attempts had been made already to cover the opening by plastic operation, but the result was only partially successful. The author took an impression of the face, and from this was able to make an excellent obturator, which served, after it had been carefully painted of a flesh tint, to save the appearances and obturate the cicatricial opening, as is shown in cut. (See preceding page.)

In the course of an extirpation for epithelioma of the face, Gerster[101 Sept.] referred to his experience and treatment in wounds of the face. He says: "From a long experience, both in hospital and private practice, I have come to the conclusion of never dressing a plastic wound on the face. I simply dust the line of incision with powdered iodoform. The first condition in these wounds is that hæmorrhage be absolutely stanched. There should not be a drop of blood at the time of closing the wound. When you have stopped all hæmorrhage you may apply the sutures. In the case of wounds of the face in children I use iodoform with glycerin. The bloody serum which exudes from the wound will form a sort of paste over it, and a crust will soon form along the line of the wound, which will constitute the best antiseptic dressing that can be put on. The only precaution I take is that the flaps be brought in direct apposition without any tension, and maintained thus by very fine silk or catgut sutures. The same procedure I apply in all operations about the face, and the harelip-pin, which is spoken of in the text-books, I consider an instrument of torture which should be abolished."

A case of epithelioma of the inner angle of the left eye, treated by extirpation and subsequent grafting of a dermal graft (Wolff's—whole thickness of the skin to the adipose layer), is reported by Gangolphe, of Lyons.[211 July 27] After the excision of the growth, the graft, which was borrowed from the inner surface of the arm (size of a circle about $\frac{1}{4}$ inch in diameter), was immediately transplanted

and stitched with five sutures. The graft took excellently, and surface completely covered. The subsequent result as to recurrence is not stated.

Szadek, corresponding editor at Kiew, Russia, reports the beneficial effects of resorcin in the treatment of rodent ulcer, 15 grains (1 gramme) of resorcin to 1 drachm (4 grammes) of vaseline.

In a paper on the "Neglected Advantages of Caustics in the Treatment of Malignant Diseases in Certain Localities," [12 Jan.] Matas has reported some cases illustrating his experience in the treatment of rodent ulcer with the aid of caustic pastes, and in which he is able to confirm Rutlin's opinion in favor of the caustic for this peculiar type of malignant disease. Since the publication of this paper increased experience has only served to make more firm his former opinion. The paste usually employed by the author is that known as Felix's paste. The formula is as follows:—

℞	Starch,	87 parts.
	Wheat-flour,	112 parts.
	Mercury bichloride,	1 part.
	Zinc chloride (gran.),	110 parts.
	Iodol (pure),	10 parts.
	Croton chloral,	10 parts.
	Camphor bromide,	10 parts.
	Carbolic acid,	10 parts.

Mix and add gradually a sufficient quantity of distilled water to form a homogeneous mass, without lumps, of the consistence of putty.

This paste, which should be made neither too soft nor too hard, will keep indefinitely. This paste is effective only on surfaces divested of their epidermal covering, and its effect can usually be measured by the length of time that it is allowed to remain. It has certainly high penetrating power, and should be used carefully over the thinner portion of the skull or important blood-tracks, because on the removal of the slough serious consequences may follow.

The successful removal of an anterior encephalocele is reported by Mittendorf, of New York. [40 July] Out of 93 cases collected by Hurd only 16 were of the nose. The three varieties of these tumors, arranged according to their frequency, are (1) encephalocele, (2) hydrencephalocele, (3) meningocele.

The result of the case speaks strongly for operative interference in cases of meningocele, and likewise in those cases of encephalocele where a comparatively small pedicle exists. The

operation should be performed as early as possible in these cases, and there is very little danger of meningitis if the necessary antiseptic precautions are observed.

An uncommon case of dermoid tumor of the fourth branchial cleft is reported by P. W. McNamara, Chicago.[779 May] On cross-section after removal it was found to consist of a well-defined wall with epithelium, somewhat like that of the integument. Its contents were granular, bony matter, a few hairs, and an imperfectly developed tooth.

Two branchial cysts and a branchiogenous carcinoma are reported by L. Hektoen.[779 May] The cases are distinguished as: 1. Cyst of the third branchial cleft; excision; primary union. 2. Cyst of the third branchial cleft; extirpation and recovery. 3. Branchial carcinoma; partial extirpation. The case of branchial carcinoma illustrates well the destructive characteristics of this rare variety of neoplasm, *viz.*: "The development in a man of 40 years of a primary tumor of the upper anterior angle of the neck, with spaces in its interior; the histology of the growth was that of a squamous-celled carcinoma; the skin covering the tumor was intact and there was no carcinoma in any of the adjacent structures."

The excision of a branchiogenic cyst is reported by McBurney, New York,[9 July 12] who says that "in the treatment of this condition such methods as the seton, which have for their object the establishment of inflammatory action within the sac for the purpose of obliterating it, should be discarded. Evacuation of the contents and the injection of iodine are insufficient and unscientific procedures, for the cysts often have prolongations running deep into the tissues of the neck which cannot be reached by such means. Treatment by simple incision and drainage has so often failed that it holds out no special inducements. If the wound were packed with gauze the obliteration might be only superficial, and a second operation is much more difficult on account of the inflammatory thickening of the tissues. Some cases of excision of the cyst are very simple, the tumor shelling out with comparative ease; while others are so difficult as to force the boldest operators to abandon the operation. One difficulty frequently met with is the attachment of the cyst to the jugular vein. This vein is readily displaced and is often emptied of blood by the tension made by the tumor;

so that a safe dissection of this region is extremely difficult. The plan proposed in this case, which was apparently an easy one, was to dissect down to the tumor and then decide upon the propriety of performing a complete excision. If this were found too dangerous, the exposed portion would be cut off and the wound allowed to granulate in the hope of securing obliteration of the remainder."

Sawicki [569 No. 21] reports 2 cases of idiopathic blood-cysts of the neck. The first case, a male aged 53 years, presented a tumor, the size of an apple, on the left side of the neck. After one aspiration the tumor refilled, but finally disappeared spontaneously. The second case, a farmer aged 23 years, presented a similar history. The cause appears to lie in some abnormality of the lymphatics and their accompanying blood-vessels.

A very instructive case of dermoid cyst of the supra-hyoid region, treated by extirpation and followed by recovery, is reported by Voituriez, of Lille. [220 Dec. 18] The author rejects the theory of Verneuil and Cussat, who believe that the median cysts originate by epidermal inclusion pinched in during the process of suture of the pharyngeal arches in the median line. He accepts the teaching of His, that these cysts are due to the persistence of the thyreoglossal duct.

An epithelioma, probably originating in a branchial cleft (third ?) was extirpated by S. E. Evans, of Cincinnati. [119 Oct. 15]

RHINOPLASTY.

In the ANNUAL for 1890 the work on rhinoplasty, by S. Trilharandes Motichand Shah, Junagadh, India, was only mentioned. The author has had an exceptional experience in the treatment of nasal deformity, and the book is certainly worth notice. The operations reported were performed for a disfigurement caused not by the ravages of disease, as is usually the case in European countries, but by willful wounding, either from spite in revenge for injury, or as an outrage inflicted on innocent individuals by miscreants, known in Junagadh State as Makrain outlaws. The 100 operations reported in the book were accumulated in the course of four years. In his early trials of rhinoplasty he formed the new nose of flaps taken from the cheeks; but after the tenth operation, not feeling satisfied with the results, he was led

to resort to the old procedure, in which the flap is dissected up from the forehead. This operation takes much less time to perform, a much more sightly nasal organ is thus formed, and the subsequent cicatricial disfigurement is less apparent, particularly in natives of the East, in whom the scar on the forehead may be easily concealed by the turban, or some other head-covering. The merit of the author's work is, therefore, mainly in the direction of perfecting the technique of the old Indian method.

A rather novel method of performing rhinoplasty in a child aged 5 is described by D. O. Ammann as having been successfully performed by Wolff, of Berlin. [34 Mar. 4] The object of the procedure was to obtain an osseous support for the new nose, and thus prevent the secondary shriveling which usually follows the ordinary skin methods. Koenig's bone-skin flap was discarded because it was too disfiguring. The method of Wolff consists in making a transverse incision completely across the root of the nose, and extending some distance beyond on each side. Two vertical and parallel incisions are now made, which meet another transverse cut, which extends on each cheek to the anterior wall of the antrum. This will leave two lateral flaps and an intervening portion of healthy skin. The nasal bones and overlying soft parts are now detached from their connections with a chisel, and the flap, consisting of bones and skin, will be deflected down so as to present the raw surface in front. The flaps which have been detached laterally are now brought over, and the new nose then secures a good resisting substratum.

The reconstruction of deformed noses by grafting a portion of the finger is the subject of a practical paper by James P. Parker, of Kansas City, Mo., [9 June 7] This procedure, which is comparatively old and well established as one of the methods of correcting nasal deformity (having been first practiced by Sabine, of New York, several years ago), is erroneously claimed as original and new by the author. Sufficient mention of the method was made in this section of the ANNUAL for 1890 to convince the author of the correctness of this criticism. He relates a case, however, which is very creditable to the method and the author's skill.

B. Merrill Rickets, of Cincinnati, Ohio, [61 June 21] contributes an interesting paper, with illustrative cases, on the external surgery of the nose.

Ohmann Dumesnil[109 Nov.] reports an aggravated case of acne rosacea (rum-nose) in the third stage, in which the deformity is produced by the hypertrophy of the tissues, the ducts of the sebaceous glands becoming enlarged, their orifices gaping. Lobules are formed, the entire integument being thickened and rough, its surface assuming a greasy, shining appearance. The patient, aged 72 years, sought relief by operative treatment on account of the serious impediment to respiration caused by nasal obstruction. The operation, performed by Bernays, consisted in the removal of the lobes of the tumor, leaving a small flap of the integument of each in order to cover the tumor mass. This flap in each case was derived from the lower part and laid up so as to bring the line of stitches at about that portion of the nose which would correspond to the sulcus of each ala. In the case of the middle lobe, of course, the line of sutures was directly across the nose. The dissection of the skin-flaps was carefully done so as to have as thin an integument as was consistent with the nutrition of the parts. Healing occurred *per primam*, the dressing having been iodoform collodion.

Gideon Becsi[57 May 19] reported to the medical section of the Hungarian Society of Natural Sciences 4 cases of rhinoplasty. In 1 case the tip of the nose had been bitten off in a love-quarrel; in the others malignant disease had caused the defect. In the first, the alæ nasi were simply pushed forward, after Balassa's method; in the others the defect was covered by a forehead flap.

LIPS.

Harelip.—As usual, the annual contingent of contributions to this topic has been abundant, and several papers of unusual interest have appeared. Carl Beck, of New York,[150 Apr. 3] wrote "On the Early Operation for Harelip and a Method of Performing it with the Least Danger," and furnishes a convincing argument in favor of the early operation. The table of cases which is appended to the author's monograph supports his contention, and, in my opinion, clearly establishes the superiority of the early over the late operation, making it a duty to operate at the earliest possible moment after the child's birth. The author reviews the varied and contradictory field of surgical opinion *pro et contra* early interference. He lays the blame of the contradictory evidence on a defective technique, which in many cases allows of an excessive

loss of blood or leaves a shortened and defective lip which unfits the child for nursing. This technique the author believes he has improved to such an extent that the hæmorrhage (the most dangerous factor in the mortality) is reduced to a minimum. The author's method consists, essentially, in this: that he introduces a prophylactic suture before the freshening of the edges of the cleft is begun, so that the moment the dissection is ended the raw surfaces are brought in confrontation and the bleeding completely suppressed. With the perfect control of the hæmorrhage that is obtained by the adoption of the prophylactic suture, the details of the operation can be more carefully attended to and better cosmetic results obtained.

Thomas H. Manley, of New York, has also been a prominent contributor on the subject. [1 Apr. 12; 101 Apr., June; 202 Sept. 25; 61 June 26] The operative treatment of simple and complicated harelip received further treatment in 1890 by Edmund Owen. [6 Jan. 25] In speaking of double harelip, with projecting intermaxillary bone and prolabium, Owen says: "The first question which the surgeon asks himself in a deformity of this sort is: 'Can the intermaxillary bones be used for filling the front of the palatine cleft after the superfluous bone has been removed from the nasal septum?' Of course, if the piece of bone can be so used, the subsequent operation upon the palatine fissure will thereby be much simplified. There are, however, two fallacies in connection with the thrusting back of the intermaxillary bone: unless it be pushed well home it may exert a pressure against the line of operation in the new lip, and so obstruct prompt and complete union; secondly, when thrust into the cleft it may fail to take up a secure attachment and may prevent that narrowing of the palatine fissure which a successful operation on the lip may be expected gradually to effect."

In a case of double harelip operated by Ashhurst, [9 Mar. 8] a small piece of cotton saturated with the compound tincture of benzoin was applied over the wound, and over this a strip of adhesive plaster, as a dressing.

C. H. Golding-Bird [2 Oct. 25] describes an operation which has some genuine claims to originality. The objects to be attained by operation are: union of the two sides of the cleft lip; maintenance of the new lip in a horizontal line and in a manner that shall not only at the operation appear satisfactory, but stand the test of subse-

quent cicatricial contraction after many weeks; perfect adaptation of the red and white of the lip on each side, and the avoidance of any mucous membrane appearing in a vertical scar; and, finally, the restoration of the depth of the shallow side of the lip, with elevation of the flattened nostril. "In all recognized operations for harelip one or more of these conditions is undoubtedly fulfilled; but an experience on just 50 cases convinces me that rules may be laid down whereby every one of these conditions may be fulfilled by one and the same operation. The operative procedure now advocated combines the various steps that have been individually practiced by different operators; yet the steps for the restoration of depth to the shallow side, and the character, give it a novelty and a justification for its having a special designation, and I have long called it 'the rectangular operation.'"

Much attention is always given to economizing tissue, so as to close the cleft, and, the author thinks, insufficient to giving depth to the lip; the former need never give anxiety; it can always be effected; but the latter is more difficult to accomplish. To insure a successful result, the surgeon should observe the position on the edge of the upper lip, where it begins to recede from the lower when the lips are together; this rarely corresponds with the edges of the cleft. Then the shape of the cleft must be noted,—that is, the inclination of its margins and whether they are equally inclined, whether one is shallower or more receding than the other, and whether the angle of the nose is acute or obtuse. A classification, as a guide to operations, may be based on these observations of single harelip, thus: symmetrical harelip, where the sides of the cleft are equal in length and inclination, but the angle of the nose may be acute or obtuse; unsymmetrical harelip, where the sides of the cleft are unequal in length and inclination, and the shallower side is almost always, as stated above, on the outside of the notch. The symmetrical variety, with acute angle above, which is rare, can be well treated by Malgaigne's operation; the unsymmetrical and obtuse-angled symmetrical are best treated by the rectangular method. In operating, the mucous membrane of the lip, along its whole length at the alveolus (and not the *frænum* merely), must be divided in every case, and then the soft parts rapidly detached from the bones of the face, even as far up as the infra-orbital foramen, if necessary,

the depressed ala of the nose being thoroughly detached from the bone. Thus the soft parts are made to slide easily over the bone and the widest cleft can thus be closed. Then perforate the lip on its deeper side (prolabium side, generally), as near the nostril as possible and just external to the red margin, and incise downward through the entire lip-thickness till the lower angle is reached; then the knife is turned so as to cut horizontally, till it arrives over the part of the upper lip which rests on the lower lip when the mouth is closed. The distance of this part of the incision from the red margin must be determined by the amount that will be required to deepen the shallow side opposite. By a vertical cut, starting about $\frac{3}{16}$ inch from the end of this incision, the paring is detached and a square, solid flap is made. A precisely similar incision is now made on the opposite or shallow side, keeping just within the white of the lip; but at its termination over the horizontal part of the lip it is made at such a distance from the red margin that it shall correspond to the thickness of the flap. It terminates by a vertical cut, as on the other side; only it stands from the extremity of the incision.

The union of the vivified parts is mainly by means of silver-wire sutures. The lowest of the wire sutures adapts the white part of the flap, the red part and the mucous membrane on the under side being carefully united with interrupted sutures of very fine silk. The mucous-membrane sutures are very important in preventing the admission of food-particles, or the separation of the wound-edges by the child's tongue. The scar that results from this operation is much like that of Mirault or Giraldes. It is L-shaped. The dressing preferred by the author is a long strip of antiseptic gauze applied as a Louis bandage and saturated with iodoform collodion.

In double harelip, where the prolabium has to be utilized as a column for the nose, the case resolves itself into one of single harelip with a very wide cleft. But where the prolabium can be utilized in the lip, it is pared on its three sides (all the red being removed) and inserted between the apposed sides of the cleft, its lower border being united to the upper surface of the flap as the latter passes beneath it to reach the notch prepared for it on the opposite side of the lip.

The heredity of harelip is the subject of an interesting note

from E. F. Plicque, Paris, [73 Oct.25] based on the family history of a female patient who came under his observation. In this case both parents, mother and father, were entirely free from deformity. On the paternal side, however, one of the uncles of the patient had supernumerary fingers. On the maternal side an uncle was born with harelip. Notwithstanding this deformity he had two children free from defects. His sister, however, the mother of the patient in question, gave birth to nine children, five of whom were affected with harelip. In none of these five was there any palatine lesion. On the other hand, however, another sister of patient's mother, who was herself free from congenital defect, gave birth to two children, both disfigured with complicated harelip and cleft palate of the worst type. It is, furthermore, an interesting fact to notice that a brother and sister of this patient, who were born with harelip, have married, and that the five children they have had present no malformation.

Manley [1 Apr.12] also emphasizes the point that in all his cases there was either a history of heredity or maternal impression. A case of left harelip (third degree), complicated with left palate, was operated (the harelip only) on the fourth day after birth by C. Galloway. [43 June] The result was successful (chloroform used).

Goodwillie [1 Mar.29] exhibited models of 2 cases of harelip, which had occurred in a family of children in which there had been altogether four double harelips and one cleft palate. In one of the cases, that of cleft palate, a great deal of bony hypertrophy and hypertrophied tissue was thrown out, entirely filling the cleft between the hard and soft palates. This it had been necessary to remove before staphylorrhaphy could be performed. It was well, in these cases in which the vomer was absent, its place being taken by hypertrophied tissue or bone, only to leave such amount as would correspond with the vomer were it in position. Carving too much away would produce a nasal resonance of the voice.

Forgue [670 Mar.15; 1 May 24] believes that the question of age for operation should be settled by statistics. Reports by different authorities are, however, conflicting. Results are modified by numerous causes, and the operation should not be held responsible for the defective condition usually existing in the ill-formed. Death, occurring several weeks after the operation, is usually to be attributed to these unfavorable natural conditions. No rule can be

laid down for all cases; the decision must depend largely upon the character of the case. A small fissure in a strong child may be closed at once. In certain ill-nourished children the operation should be postponed till the second three months, while very complicated cases should not be attempted under the age of 2 years. It is unwise in any case to wait until the 4th or 5th year, for the parts have then become so fixed that a satisfactory result can rarely be obtained.

Cancer of Lips.—Forgue [100 Mar.26] discusses the operative treatment of cancer of the lips. The question, What are the results of surgical interference in case of cancer of the lips? is answered by presenting the well-known statistics accumulated by Worner, Maïweg, and Czerny. Worner collected, from 1843 to 1884, 866 cases of labial cancer which had been operated. Of these 28.1 per cent. recovered permanently. Maïweg in his thesis collected 182 operated at the Bonn clinic from 1866 to 1887. Of these 57 recurred and died; 44 recovered, but had not yet completed the third year after the operation; 32 have passed the third year since the operation without recurrence; 49 have already completed the sixth year since the operation and have not relapsed. Forgue concludes that cancer of the lips is radically curable, and that, as long as the carotid glands are not involved, treatment is in order.

Zielewicz, of Posen, [84 Mar.8] read a paper at the Congress of Polish Surgeons on conservative treatment of cancer of the lower lip. He speaks discouragingly of the results of surgical interference in cancerous disease, and contends that, notwithstanding the remarkable progress accomplished during the antiseptic period, the ultimate prognosis of malignant disease is practically the same as before this period. While limiting operative interference in cancer of the lower lip to the very early stages of the disease, he condemns all attempts at radical operation in the more advanced stages complicated with glandular infection. In such cases he advocates a palliative operation, and removes the neoplasm only in so much as is required by the appearance and hygienic conditions. He circumscribes the diseased area with a line of puncture made with the galvano-cautery. He then waits a few days and extirpates the circumscribed area with the galvano-caustic knife. The whole operation is performed bloodlessly; he covers the wound with iodoform gauze, and after the falling of the slough he applies

antiseptic dressings. No plastic operation is attempted to cover the defect. In the discussion following the reading of this paper, Schramm remarked that the only difference between the older methods and Zielewicz's was that the galvano-cautery was substituted for the knife, and that the patient gains thereby nothing, and, in fact, cannot be well satisfied if the saliva escapes continually from the mouth owing to the gap in the lip region that remains uncovered. Wehr spoke favorably of the galvano-cautery, as he believes with Hahn that the cancer contagium is forced into healthy tissues by operations with the knife.

Zielewicz said that he did not aim in his operation at the removal of the cancer, for he believes that that is absolutely impossible; his operation is palliative. He showed the photograph of a person operated by his method in whom nine-tenths of the lip were removed, and yet no dribbling of saliva took place. Schramm believed that cases exist illustrating the operative cure of cancer. Obalinski observed that with the present methods of operating, in which all diseased glands are removed, relapses become continually rarer. He knows of a case operated on eighteen years ago which remains free from recurrence to the present day. Dembrowski cited examples from the clinic of Wahl, of Dorpat, without relapse after ten years. The distant glands, often microscopically examined, revealed no cancerous changes.

PALATE.

In the ANNUAL for 1890 we had occasion to refer to Billroth's modification of V. Langenbeck's uranostaphylorrhaphy. Since then, Salzer,[336 Mar.29] Billroth's assistant, has published an authorized account of this operation. The favorable results of English operators, but especially the excellent functional results of J. Wolff[226 v.28] and of Kappeler,[123 '95] again directed Billroth's attention to the operation for cleft palate, and since November 21, 1888, he has frequently performed it with the aid of a simplified modification. The tension incisions (of Ferguson's method) are not adopted, but the medial plate of the processus pterygoideus is separated instead, on a level with the base of the hamular process (submucously), so that by a temporary dislocation at the point of insertion the palatine tension factors are relaxed. This technical modification has proved successful in 15 cases of cleft palate operated in Billroth's clinic.

Julius Wolff, of Berlin,[336] June 21 contributed a practical paper on "The Suture of Clefts and Defects of the Velum Palatinum Without Cutting Through the Muscles of the Palate." As is well known, in operations upon the soft palate it has heretofore been deemed of the greatest importance to provide against tension upon the parts by myotomy of the lateral palatine muscular structures. Contrary to the teachings of Dieffenbach, Ferguson, and Langenbeck, Wolff declares that the structures comprising the soft palate are the most elastic in the entire organism, and by virtue of these qualities section of the muscles may be dispensed with. He operates as follows: Incisions are made in the usual manner in the hard palate, along the alveolar border to the posterior boundary of the latter. The muco-periosteal structures of the hard palate are now carefully loosened, first from the surface of the mouth and from the edges of the cleft in the hard palate, then from the posterior edge of the horizontal portion of the bony palate and from the neighboring pyramidal processes of the latter in so far as may be required, in order to approximate properly and easily the edges of the cleft in the median line, where they are sutured in the usual manner.

Since October, 1889, less than a year, Wolff operated ten times in this manner, and with uniformly favorable results. In not a single instance did he practice section of the muscles. In these cases there occurred an improvement in the speech considerably in advance of that which follows ordinarily, and this is attributed by the author to the fact that the muscular structures were not interfered with. Even in Billroth's procedure (chiseling off of the pterygoid process) there is some interference with the muscular attachments, which, according to Wolff, may be avoided by the method herein suggested.

In the last 4 cases operated by him the palatine and alveolar halves have been united by fine sutures, not only on the anterior, but also on their posterior surface. These posterior sutures are intended especially to approximate the uppermost parts of the pharyngo-palatine arch.

Le Dentu[31] June 1 contributes a study of uranoplasty and staphylorrhaphy based upon a personal experience of 21 cases.

The author states that for the last fifteen years he has taught that very complicated cases of harelip should not be operated on until the child has acquired sufficient resistance,—say, until

the 8th month or 2d year. In regard to the age best suited to operation on the palatine cleft, while not attempting to lay any hard and fast rules, he believes that the operation is perfectly safe after the 5th year, while at a more tender age there is decided danger. As to the technique, it is almost exclusively Trélat's.

Polaillon [17 July 18] reports 2 cases of cleft palate in which he found it advantageous to first cocainize the palatine mucous membrane, then map out and partially detach the flaps to be dissected from the palate. In this preliminary operation the incisions made sever the deeper branches of the post-palatine arteries, which are a source of annoying hæmorrhage during the operation. Methodical compression arrests this hæmorrhage, but causes great loss of time, which is avoided in the second sitting, when mucous membrane is detached under chloroform and without hæmorrhage. Polaillon undertakes the second operation the day after the first sitting. In this connection it is well to remember that J. Wolff, of Berlin, has for some time past advocated the performance of uranoplasty in children in several sittings. Wolff's object in so doing is, however, rather to secure the nutrition of the flaps than prepare the field against hæmorrhage.

M. F. Coomes, Louisville, [224 Aug. 2] reports 2 cases of cleft in the soft palate. The respective ages were 5 and 15 years. Experience proved that cocaine was not the anæsthetic for these cases, and that the final union of the wound should not be despaired of as long as even one suture holds in place.

A case of cure of cleft of the soft palate by a double-flap operation and closure with the buried tendon suture is reported by Marcy, of Boston. [61 Oct. 26]

J. N. C. Davies-Colley, of London, [2 Oct. 26] describes a new "method of closing clefts of the hard palate by operation," and relates a case in which Dieffenbach's and the ordinary method (Langenbeck's ?) had failed to effect a closure, and in which this operation was successfully resorted to. The soft palate is not touched in this operation in very young children; it is the work of another operation to complete it. In older children, over 12 years, he has had no difficulty in closing the whole gap. The author strongly recommends this procedure in (1) the cleft palate of infants; (2) in patients on whom the ordinary operation of cleft

of the hard palate has failed; (3) when the separation of the sides of the hard palate is too great to be bridged over by the ordinary operation.

In a paper based on a review of Erhman's monograph on plastic operations on the palate in infants,[1163] Adrien Pozzi, of Rheims,[55] devotes considerable attention to the phonetic results of plastic palatine operations. He believes with Erhman (whose authority is based on an experience of nearly 50 cases) that the ultimate phonetic results are mainly dependent upon the anatomical conditions which follow the operative restoration of the palatine arch. According to Erhman's experience, uranoplasty usually interferes with the complete development of the skeleton of the arch, and for this reason he believes that operations should be postponed to the period of the second dentition (the 10th or 12th year), when the palate has acquired its definitive breadth and the developmental forms have reached their maximum.

A case of undoubted primary epithelioma of the soft palate is reported by F. Cohn.[150] Judging by the literature, primary epithelioma of the soft palate is rare. The author has been able to collect only 5 cases; 3 of these are mentioned in the well-known monograph of Paget, a fourth case was described by Page, a fifth by Morris. Two specimens from cases of complicated harelip were presented to the Société Anatomique, of Paris, (1) by Erhhardt,[7] left harelip and cleft palate, involving bones and soft parts, and (2) an exactly similar case by R. Gabourand,[7] in which the disposition of the dental follicles confirmed Albrecht's theory as to the development of the premaxilla.

TONGUE.

A case of actinomycosis of the tongue, interesting on account of the manner of infection, has been reported by Maydl.[6] The patient was himself a physician, acting as a veterinary inspector at a Polish town, where he had to watch over the importation of cattle from Russia. As he had to look sometimes through hundreds of papers containing the particulars of the consignments of cattle, he became accustomed to moisten his fingers on his tongue, in order to turn over more easily the numerous sheets of paper presented to him by the cattle-drivers. After indulging in this habit for some months he observed a swelling of his tongue, which

he feared at first to be a cancer; but, taking also into consideration the fact that several cases of actinomycosis had been observed among the cattle examined by him, he believed in the possibility of an infection by the disease. The microscopical examination of the pus discharged revealed the presence of actinomycosis. The abscess was scraped out, and the patient recovered soon after the operation.

N. C. Davis, Good Thunder, Minn., $^{850}_{June}$ reports the case of a boy, aged 7, who accidentally cut off the tip of the tongue, it being held only by a few fibres. There was considerable hæmorrhage, which was controlled by a dilute solution of persulphate of iron. In spite of this application, good union was obtained by suturing the divided portions under chloroform. Five silk sutures were applied on the dorsal side and six on the inferior surface.

James Berry $^{6}_{May\ 21}$ showed, at the London Pathological Society, a fibro-cartilaginous tumor which he had removed from the tongue of a man aged 49 years. It had been growing slowly for five years. It was situated in the right border of the tongue, about half-way between base and tip. It had attained the size of a small hazel-nut. It projected markedly from the tongue, to which it was attached by a slightly constricted base. On the surface it was smooth and covered by mucous membrane, which moved freely upon it. Berry said the chief interest of the specimen lay in its rarity, fibro-cartilaginous tumors being very seldom found in this region. He has not been able to find any mention of a similar specimen in the Transactions of the Society. A few somewhat similar cases have been recorded by Weber, Bastian, and others, but in most of them the patient was much younger and the tumor probably congenital.

A case of primary lipoma of tongue, followed by one in the left and another in the right axilla, is reported. $^{77}_{Dec.,'89}$ At the base of the right side of the tongue the tumor could be seen to be about the size of an English walnut, and, although usually in the pharyngeal cavity, it could be brought into the oral cavity by stretching the tongue. Its removal was accomplished, under cocaine, by means of the galvano-caustic snare.

Barker $^{6}_{Apr.13}$ described in detail to the Pathological Society of London the condition of a tongue the greater part of which he had removed from a child some years ago, with complete relief,

The diagnosis has been "lymphagioma cavernosum." The condition was congenital, but had been greatly aggravated by acute and subacute attacks of glossitis occurring from time to time. There had been no recurrence since operation, and the shape of the tongue was excellent. The examination of the specimen confirmed the views of the author, viz., that macroglossia was in most cases due to lymphangiectasis alone, with but little change in the other structures of the organ.

George Fischer [301 Sept.5,'90; 61 Feb.] describes a mixed tumor of the tongue, composed of cavernous angioma and fibroma, and which, to the best of his knowledge, has not been described before. The article is followed by a summary of the subject of lingual fibroma, with remarks on diagnosis and treatment. The opinion is expressed that such tumors cannot be extirpated with the knife, and that hermo-caustic or electrolytic treatment is the proper procedure.

A memoir on glandular tumors of the buccal mucous membrane, addressed to the Paris Surgical Society, [3 Jan.22] elicited an instructive discussion. The tumors in question are observed principally in adult subjects varying in age from the 19th to the 60th year, and are usually situated either on a level with the veil and vault of the palate or in the inner surface of the cheeks or lips. They were long ago connected with the glands which are found in the mucous membrane of these regions. They vary in size from a lentil to a hen's egg; their surface is generally rounded, their consistence firm; the mucous membrane which covers the tumors is usually intact; the tumors are encapsulated, which greatly facilitates their enucleation. The development is slow and does not end in ulceration. These tumors were at first regarded as hypertrophied glands, but were afterward classed with the adenomas. An examination by Thaon of a specimen removed in Verneuil's service demonstrated that, microscopically, these tumors are true mixed epitheliomas, as Larabie also teaches. The microscopic structure is characterized by an important connective-tissue net-work embracing the epithelial infiltration. In the younger tumors the epithelial elements predominate; later on, the connective-tissue elements assume the ascendency, which accounts, most probably, for the relative benignity of the growths. In view of the possibilities of true carcinomatous development in these

tumors, Larabie advises not only early enucleation, but free excision of the surrounding tissues as well.

At the annual meeting of the American Laryngological Association, Roe[99] July 2 exhibited a guillotine, made on the principle of the tonsillotome, for removing hypertrophied adenoid tissue from the dorsum of the tongue. Bosworth said that in unskillful hands there was danger of cutting of the epiglottis.

Apropos of instruments, G. M. Pease, San Francisco, Cal., [59] Jan. 20 has invented a frænum scissors which will allow the operator to dispose of a case of tongue-tie with a single snip of the scissors.

A case of papilloma of the tongue successfully removed by electrolysis and galvano-cautery, is reported by F. S. Coverton, Toronto. [39] June 16 The papilloma occurred on dorsum of tongue, in a child aged 2½ years.

Epithelioma of Tongue and Mouth.—In the ANNUAL for 1890 we had occasion to notice the statistical studies of Roger Williams on cancer of the lip. This author now presents a valuable contribution on epithelioma of the tongue and mouth, based on an analysis of the records of 135 cases.[22] Dec. 4, '90 It is impossible to condense this work, and we will limit our notice to a few quotations:—

As regards the relative frequency of 13,824 neoplasms consecutively under treatment at Middlesex, St. Bartholomew's, St. Thomas's, and University College Hospitals, during the last sixteen to twenty-one years, 880, or 6.3 per cent., originated in the tongue and mouth; 19.2 per cent. originated in the uterus; 17.5 per cent. in the breast; 9.4 per cent. on the skin; 7.7 per cent. in the connective tissue; 5.8 per cent. in the ovary; 5.1 per cent. in the external genitals; 4 per cent. in the bones; 3.3 per cent. in the rectum; 2.9 per cent. in the maxillæ; 2.6 per cent. in the stomach; 2.6 per cent. on the lip, and 13.6 per cent. in all other parts.

The nature and distribution of the 880 neoplasms of the tongue and mouth is shown in a table, from which we glean that out of 880 tongue-neoplasms 804 were epitheliomata, 14 sarcomata, 1 myxoma, 4 adenomata, 19 papillomata, 3 fibromata, 8 angiomata, 27 cystomata. From this table it also appears that out of the whole number of cases 17 per cent. were in women.

The author then analyzes 135 cases of epithelioma consecutively under treatment at the Middlesex Hospital during the last seven years. Of these there were 122 males. The earliest age

at which the disease was *first noticed*, in 100 cases, was 25.6 years; the latest, 78.5; the mean age, 53.8 years.

Of 62 fatal cases, the total duration of life—dating from the time when the disease was first noticed—averaged 19.1 months in 33 cases that had undergone *excision*, and 18.4 months in the 29 cases for which *no operation* had been performed.

The duration of life subsequent to the excision of the primary disease in 33 fatal cases averaged 8.9 months; the longest, 39.3 months.

In studying the original seat of the disease in 100 cases, the right edge of the tongue was found to be attacked first in 20 cases; the floor of the mouth near frænum in 21 cases; left edge of the tongue, 18 cases; buccal surface of cheek, 10 cases, etc., etc.

As to the mode of origin, in 100 cases, the initial lesion is described as a small sore, crack, or ulcer in 65 cases; hard lump or nodule, 18 cases; a pimple, 5 cases.

Of 130 cases, 96 were found to be primary and 34 recurrent.

The average interval between the first operation and the first obvious occurrence in 32 of these cases was five months, the maximum fifty-two months, the minimum two weeks.

In 54 cases the primary was removed by operation as follows: Excised with knife, 16 cases, 2 deaths; with scissors, 24 cases, 2 deaths; with wire écraseur, 12 cases, 5 deaths; with actual cautery, no deaths. Total, 54 cases, 9 deaths; mortality, 16.6 per cent.

Atrophic Cancer of the Tongue.—Cerné[208 Feb.] reports a case of this nature. The patient, a woman 73 years of age, was seen just prior to death. She suffered from intense dyspnœa and dysphagia due to contraction of the isthmus of the fauces by a tumor which had invaded the right side of the velum palati. It occupied, likewise, the entire roof of the mouth, which was indurated and sclerotic, and plainly exposed upon the right side, upon which a sort of excavation had resulted from destruction of the tongue. The surface of the excavation was mammillated, superficially ulcerated, devoid of vegetations or notable secretions, and scarcely bleeding upon being touched. Upon the left side was seen the remnant of the tongue, free from ulceration, straight, slightly movable, and fissured. At the angle of the jaw was a hard and pretty large ganglion. The patient stated that the disease resulted from purulent bronchitis,

In operating on a case of epithelioma of the tongue, Verneuil[24 Feb.] said: "In all cases of lingual cancer, three groups of lymphatic glands must be examined: the submaxillary, at the angle of the jaw; the supra-hyoid, in the middle line of neck; the group over the carotid sheath. If the carotid group should be involved, the case must be regarded as inoperable."

The Medical Society of Victoria[285 Oct. 15] discussed 2 cases of excision of the tongue for epithelioma reported by W. Moore. In both these cases the disease was extensive, and tracheotomy was performed as a preliminary. The immediate operative results were good. R. B. Duncan also contributed "Notes on Excision of the Tongue." In both these papers a valuable consideration of the operative details is found.

Frederick Peterson,[59 Aug. 20] in a note upon the disturbance of the sense of taste after amputation of the tongue, based upon the study of 2 cases in which the tongue had been completely removed for epithelioma, concludes that: 1. The perception of sourness was lost altogether, in both these cases, after extirpation of the tongue. 2. In one case bitterness was feebly perceived by the soft palate, strongly by the posterior wall of the pharynx; sweetness was not perceived at all by either the palate or pharynx, but probably by the surface of the epiglottis; the galvanic current produced no sensation of taste whatever; the olfactory sense was totally abolished. 3. In the second case, examined soon after the operation, the preceding disturbances of the sense of taste could not be determined. Besides the loss of sensibility to acids, the patient did not recognize sweets.

SURGERY OF THE TRIGEMINUS.

The year 1890 has not been as prolific as its predecessor in the introduction of new methods for the excision of the individual branches of the fifth pair. Most noteworthy is the paper of William Rose, of London,[6 Nov. 1] who, on April 2, 1890, succeeded in removing the Gasserian ganglion in a case of intractable neuralgia. The patient, a lady aged 60, had suffered for years with a most acute neuralgia, first affecting the inferior division of the fifth nerve. Rose stretched the inferior dental nerve and then divided its mental branches. This gave some passing relief and he did not see the patient again until March, 1889, when, as she was suffering

from severe pain, he trephined the lower jaw and cut away a piece of the nerve-trunk. Relief again followed, but in March, 1890, her old pain had returned, the right side of the tongue being involved in addition, indicating extension of the mischief to the lingual nerve. He therefore cut down upon the inferior and lingual nerves in the pterygoid region through an incision parallel to the zygoma. He observed that he had performed this operation on several occasions at the suggestion of Victor Horsley. The operation was not very satisfactory, owing to the abundant hæmorrhage, but he felt convinced that he had divided and partially excised both nerves in this region. The result of this operation was to produce numbness on the right side of the tongue and integument of the lower jaw. Unfortunately, the pain, which had occasionally manifested itself in the upper jaw and cheek, became greatly intensified. It implicated the alveolar border of the right upper jaw and extended to the vertex of the head, showing that the superior maxillary division of the fifth nerve was involved. He then determined to remove the Gasserian ganglion, as suggested by his colleague, Ferrier, and to remove the upper maxilla at the same time, (1) because he believed there was an extensive disease of the nerves in the maxillary bone itself; (2) that the manipulations at the base of the skull would be greatly facilitated by the removal of the upper jaw; and (3) in deference to the express wish of the patient, that, whatever he did, he should remove what she called the "focus" of her suffering. Accordingly, on April 2d he proceeded to remove the upper maxilla in the usual way, and then, with a skull in front of him to serve as a guide, he inserted the pin of a half-inch trephine into the foramen ovale and removed a ring of bone, which he exhibited to the society. He then caught sight of the Gasserian ganglion lying in the petrous bone, passed an aneurism needle gently beneath it, and removed it without injuring the dura mater. The patient suffered somewhat from shock, but on the following day her condition was satisfactory. She, however, complained of heat and pain at the back of the right eyeball, which was much congested. This increased and resulted in panophthalmitis, necessitating removal of the eye. Her progress in all other respects was very satisfactory. The old pain had quite ceased and had not since returned. He thought that in future, when it was necessary to remove the ganglion, this might perhaps be accomplished with-

out removing the jaw. He extremely regretted the loss of the eye, but was disposed to consider it accidental, and not a necessary result of the operation.

M. H. Richardson $_{Feb.8}^{2}$ showed a patient to the Boston Society for Medical Observation who had had successively destroyed the supra-orbital, infra-orbital at Meckel's ganglion, the buccal, inferior dental, and inferior maxillary nerves. A striking feature was the slight deformity caused by the operation. The operation was practically performed after Pancoast's method.

M. H. Richardson $_{Mar.12}^{2}$ also read a paper on a dissection of the inferior maxillary nerve and the foramen ovale, illustrating a new method of dividing that nerve for neuralgia.

At the Clinical Society of London, Bland Sutton $_{Nov.30,'99}^{2}$ related the details of a case in which a woman was supposed to be suffering from neuralgia and bad teeth. Subsequently a slight displacement of the eyeball was detected, and a critical examination of the patient led to the diagnosis of tumor entangling the infra-orbital nerve. The skin supplied by the palpebral, nasal, and labial branches of the nerve was anæsthetic. She suffered agonizing pain. The anterior wall of the maxilla was removed and Meckel's ganglion exposed and destroyed with the cautery. An admirable recovery resulted. On subsequent dissection the tumor was found to be a myxoma springing from the infra-orbital nerve and invading the orbit and antrum. Sutton believes this to be the first case reported of a myxoma affecting a branch of the fifth nerve and filling the antrum, and that there is strong probability that they have often occurred, but have been either overlooked or mistaken for sarcomata. The importance of a correct diagnosis is obvious, as these tumors, being benign, might be enucleated and excision of the whole bone obviated.

At the Berlin Medical Society, James Israel $_{Jan.20}^{4}$ demonstrated a preparation of the superior maxillary division of the fifth nerve, removed by operation. This was performed after Thiersch's method, which consists in freely exposing the infra-orbital at the foramen of exit. The nerve is seized with a small forceps obliquely to its length and is drawn out very slowly by turning the forceps around the nerve in a central as well as a peripheral direction, in such a manner that, as the operation goes on, the nerve winds itself around the forceps. The operator succeeds by this process in

bringing out the peripheral branches of the nerve almost to its finest distribution, and the central trunk is also pulled off as far as the sphenoidal fissure. A slight facial palsy follows the removal of the second trigeminal nerve in this way, and is due, in all probability, to the simultaneous removal of anastomosing facial branches.

Weir, of New York, $\frac{9}{\text{Feb.16}}$ reports a successful resection of the inferior dental nerve by lifting the masseter off from the ramus of the lower jaw and chiseling the bone down to the inferior dental, opposite the spine.

SURGICAL MYCOSES.

By ERNEST LAPLACE, A.M., M.D.,
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SURGICAL TUBERCULOSIS.

Etiology.—The advance of bacteriological research has resulted in establishing the identity of certain diseases; thus, scrofulous glands are now known to be of a tuberculous nature, while Parietti [50 Oct. 30] and Pfeiffer [69 Nov. 28, '98] describe a form of pseudo-tuberculosis affecting the lower animals in very nearly the same manner as genuine tuberculosis, and to the naked eye presenting no appreciable difference. Wheaton [2 May 24] tells of a case, primarily one of tubercle, in which a fungus (aspergillus niger) grew in the bronchi and lung and simulated actinomycosis. The existence of muscular tuberculosis has been demonstrated by Moulé [3 June 4] in a hog. Deep in the muscular region of the thigh were gray nodules representing tubercles, which on inoculation reproduced the disease in other animals, and on microscopical examination revealed the presence of numerous bacilli of tuberculosis; likewise a case of tuberculosis in the humero-radial articulation of an ox, from which bacilli had penetrated into the medulla of the bone, transforming it into fibrous tissue.

Wohlgemuth [5 Aug.] concludes that: 1. Tubercular disease of the glands is very common in the first ten years of life. 2. The glands of the neck are involved in the majority of cases of this disease. 3. The susceptibility of boys and girls to this disease seems to be about the same. 4. The prognosis of tubercular disease of the glands in young children is generally better than in adults. 5. If tubercular disease in glands is disseminated, the prognosis is less favorable than if it is local. 6. Removal of the glands is not a dangerous operation, and should be resorted to immediately in order to destroy the focus of disease.

Treatment.—Clinical evidence has rapidly been concentrated during the past year upon the necessity of operative measures in

surgical tuberculosis. Dandois, [378 June 26] comparing this procedure with the hygienic and medical one, assures us, from numerous statistics, that its superiority is marked, inasmuch as the cure is more rapid and complete. Furthermore, the general conclusion on the value of radical surgical measures reached by the French Surgical Congress [67 Dec. 15, '89] is, that "if local tuberculosis is an accident, should it be suppressed before it becomes general?" The patient is cured, almost always, by a comparatively trifling operation. If the local tuberculosis is the expression of a general cause, this treatment still produces the best results, as by it offensive foci are destroyed, lessening the dangers of further weakening; and no real disadvantage can be brought to bear against the method.

Milton, [418 V. 8] reports 1000 cases of the extirpation of tuberculous glands, without a single case of pyæmia or septicæmia and only 2 cases of erysipelas, in both of which the infection was traced to a dresser. Of course, he admits that sometimes there is recurrence, and in several cases the old wound has been opened up again and the newly-affected glands removed. These secondary operations, owing to the manner in which the important structures are displaced and bound down, are among the most difficult. One of the best criterions of the success of this method of treatment is the ever-increasing number of patients who present themselves for operation, and who nearly all enter the hospital asking for the removal of their enlarged glands. Cazin [211 Jan. 19] says that out of 335 children treated he removed the tuberculous glands in 102. The operated cases gave a percentage of 83.34 cured and the non-operated cases 68.77 per cent.; that is, 14.56 per cent. in favor of the operation. Generalization of the disease could be found only in 1 per cent. of the cases.

Villeneuve [46 Feb.] relates a case of tuberculosis of the parotid gland successfully removed, with subsequent cure. Von Noorden, [13 July] reports 506 cases, of whom 286 were operated on and 220 underwent the medical treatment. Of the operated cases, 149 were carefully followed during three years; 93 (62.4 per cent.) have not shown the least sign of return of the affection. In the remaining 56 cases there was a return.

Of the 149 non-operated cases, 28 died in sixteen years (18 per cent.) from general tuberculosis and 14 are still alive, but have developed pulmonary tuberculosis. Thornton [22 Mar. 19] relates

that his own experience in the removal of tuberculous glands in children amounts to 200 cases during the last three years, irrespective of those he saw under the care of others. In the various modes of treating enlarged glands in their different stages, such as erosion, by poultice, iodine, paints, mercurial ointments, calcium sulphide, etc., the process was always tedious and uncertain, and the resulting scars unsightly. His operative experience led him to urge the excision of every enlarged gland after a reasonable period of medical treatment. Modified operations, such as scooping, aspiration, small punctures, were always unsatisfactory, as diseased gland-tissue was left behind. He has never met with unfavorable results, and claims that by the method of excision many months of tedious treatment were saved, the resulting scars were less unsightly, and the operation, if performed with skill and care, was generally successful.

Bronner $_{\text{Sept.20}}^{2}$ establishes the relation between disease of the pharyngeal tonsil and cervical adenitis in children. He has tested the truth of this by removing the cervical glands and leaving the adenoids untouched. The situation of this growth is highly suited to bacterial infection and propagation, which, once initiated, soon involves the lymphatic system of the head and neck. Iscovesco $_{\text{Sept.17}}^{3}$ advises the sea-shore for a short time (not longer than two months), after which tuberculous children fall back into their previous condition from loss of appetite.

Bertin and Picq $_{\text{Nov.12}}^{127}$ have undertaken the treatment of tuberculosis in man by the transfusion of the blood of the goat, which animal is known to possess immunity against tuberculosis. This step was taken after having successfully protected rabbits from tuberculosis by this procedure.

TUBERCULOUS ABSCESSES.

The iodoform treatment introduced by Verneuil has obtained the first rank in treating cold abscesses. Iodoform intoxication is not to be feared if the doses do not surpass 5 grammes (1¼ drachms) of iodoform. Barais $_{\text{Aug.24}}^{211}$ relates the experiments of Rendrick, from which it is concluded that in iodoform injections (1) this substance is gradually changed into fat; (2) in a few hours there is a separation of iodine from the fat; (3) the iodine thus liberated forms albuminous clots, which soon disappear. The most important article of the year on the subject is certainly by Billroth, $_{\text{Mar.18,90}}^{8}$ who

recommends the parenchymatous injections of iodoform emulsions. The formula used is that of Moorhof:—

℞ Iodoform pure,	10.0	parts.
Glycerin,	80.0	"
Distilled water,	10.0	"
Gum tragacanth,	0.30	"

The results of this emulsion have exceeded Billroth's most sanguine expectations, except in some abscesses originating in the vertebral column, where the treatment seemed too dangerous to be tried. The technique is as follows: Antiseptic precautions having been taken, the abscess is carefully evacuated and washed with a solution of sublimate (1 to 3000). If there is a cavity in the bone, this is energetically cleansed. The wound is next stitched up, except a large opening through which the emulsion is poured into the cavity. Sometimes healing takes place kindly without reaction. In other cases, on the contrary, great pain and high fever soon supervene, and the abscess swells to such an extent as to burst the stitches. These are then removed and a drainage-tube inserted, and the abscess treated every other day with more of the emulsion. Recovery takes place in from five to six weeks. If, after this time, no sure signs of definite recovery appear, the operation must be repeated. The worst cases of very large abscesses and fistula gave, in Billroth's hands, the best results, not merely proportionately but absolutely.

Jasinski, of Cracow, $^{6}_{\text{May 24}}$ treated 86 cases of cold abscess by means of injections through a trocar of iodoform emulsion, with encouraging results. A certain number were cured after one injection, others after two or three injections. In 11 cases the abscess broke, and an enormous quantity of pus, mixed with iodoform, was evacuated. These cases were all cured without any further surgical interference. In 19 cases an incision had to be made; the cavity was then washed out with carbolized water, iodoform emulsion injected, and the wound sewn up after inserting a drainage-tube. Though 180 grammes (5¾ ounces) of a 10-per-cent. emulsion were injected, at no time were toxic effects observed.

Bruns, of Tübingen, $^{13}_{\text{July}}$ praises the antitubercular action of iodoform. He has treated 100 cold abscesses with injections of this drug, and 80 of them were cured. Ten cases of abscess from caries of the vertebra healed up one after the other under this

treatment. The iodoform must remain for long periods in direct contact with the tuberculous material in order to effect a cure. He favors a mixture of iodoform in glycerin and olive-oil, freshly prepared and sterilized. This mixture is much to be preferred to iodoform in ether. He has had the same success in tubercular joint disease. Bauer[786 Jan.] also advises the 10-per-cent. iodoform emulsion, according to the views of Volkmann and Krause. Biot[211 Nov. 24, '99] recommends the treatment of cold abscesses by elastic compression after evacuation and washing out the cavity. In a certain case he withdrew 650 grammes (20 ounces) of pus, and applied an India-rubber bandage. After three sittings the abscess-walls had reunited. A young girl having a cold abscess of the thoracic region was much improved by the same treatment.

Jasinski[109 May] reports his experience with Peruvian balsam as a remedy for coxitis and various affections of the joints due to tuberculosis. He used the drug, *per se*, slightly diluted in spirits of wine. In some cases he applied dressings soaked in the fluid; in others he injected it into tubercular cavities, repeating the injections three times a day or once every one, two, or three days, according to the necessities of the case. In others he kept the cavity constantly filled up with the balsam. The results were almost invariably brilliant, suppuration and inflammation rapidly subsiding and complete healing taking place after treatment of from a fortnight to a month's duration, The balsam also proved beneficial in tuberculous affections of the skin.

SUPPURATION.

Lannois[211 Aug. 24] reports the case of a child 8 years old who contracted a general infectious adenitis from the staphylococcus pyogenes aureus. Death ensued. The blood, during life, was found to contain the above micro-organism, from which cultures were made that proved fatal to rabbits. The autopsy did not reveal any degeneration of the glands, though they were greatly hypertrophied. Bidwell[2 Feb. 8] reports a case of pyæmic abscess of the sternum. The sac was the size of a large walnut; the whole of the upper two-thirds of the gladiolus and lower part of the manubrium were absent. The child was 4 weeks old. The abscess was aspirated, and an ounce (32 grammes) of foul pus evacuated. The child soon died. On post-mortem examination the umbilical vein was

found dilated and filled with pus. Both pleuræ and pericardia were adherent to the abscess-sac. The abscess had its origin in the sterno-clavicular joint and was pyæmic.

McDonald[105 Jan. 1] divides the treatment of abscesses into (1) treatment by antiseptic injection without a free opening; (2) treatment by free opening and irrigation. He emphasizes the fact that, suppuration being due to micro-organisms, the treatment should be simply a battle with these germs, the principles of asepsis guiding us throughout.

Steinhaus,[69 Dec. 12, '89.] from a number of valuable researches, concludes that mechanical irritation alone cannot produce suppuration. The irritation must consist of a chemical which also attacks the vitality of the proliferating cells. Ptomaines, etc., are capable of producing suppuration without the presence of living organisms.

Janowski[69 Dec. 12, '89.] finds that turpentine produces an aseptic suppuration in dogs, and that, on the other hand, dead cultures of micrococcus prodigiosus also produced suppuration, showing that it is not always the living organism that produces the suppuration, but more especially the irritation from the chemical product or ptomaine incident to its growth. Ammonia, on the other hand, is a highly irritating substance, but does not produce suppuration. He even doubts the possibility of producing suppuration by the injection of croton-oil alone, as it does not enter into direct chemical combination with the cells of the parts.

FURUNCLES.

It has been the custom, in inflammations of the skin and of the cellular tissue, to hasten the maturity of the tumor and to give issue to the pus as soon as possible. Bacteriology has taught us that pus is produced by the streptococcus pyogenes aureus, and, this micro-organism being destroyed, suppuration should disappear; hence the direct application of antiseptics to furuncles, as originally suggested by Verneuil, in the form of a carbolic spray, to prevent suppuration or abort them. Jasiewicz[824 Feb.] gives an exhaustive theoretical as well as practical essay in support of this measure.

Leu[336 Aug. 22] has used Hüter's method of injecting carbolic acid in furuncles. He first makes an incision with a lancet, and through this introduces the hypodermic syringe, and injects in all directions a carbolic-acid solution of 1.5 to 2.5 per cent. He considers the

preliminary incision essential, inasmuch as it is not painful. The average duration of the treatment has been from three to six days. The congestion and swelling disappear rapidly.

LYMPHADENOMA.

In the Paris Surgical Society, Reclus [3 Nov. 20, '90] related the case of a young man who was subject to lymphadenoma, a large mass of glands occupying both sides of the neck, from the mastoid to the clavicle, extending posteriorly beneath the trapezius muscle and causing some dyspnœa. There were no swelling in other situations, no signs of tubercle, and no leucocytosis. As extirpation was out of the question, arsenical treatment was vigorously pushed, commencing with 5 drops of Fowler's solution daily, which was increased by 2 drops every day, when injections were also made directly into the hypertrophied glands. Small abscesses were produced by the injections, but healed spontaneously, and at the end of two months, when as much as 25 drops per day were being taken, a notable diminution had taken place and the treatment was suspended. It was, however, renewed from time to time, and only two or three scarcely perceptible nodules remaining at the site of the previous tumor. He reported 2 other cases in which the result was not favorable. Although arsenic cannot be called a specific, yet it is certainly efficacious in lymphadenoma. It was the opinion of the society that lymphadenoma sometimes presents a benign form and sometimes a malignant or rapidly generalized type. J. William White [80 Apr.] describes an interesting case of a young girl afflicted with lymphadenoma, or Hodgkin's disease, having large, rounded tumors on both sides of the neck, elastic and painless. There was great anæmia, and the spleen was enlarged. The differential diagnosis of various glandular enlargement is given as a *résumé* of the article.

ACTINOMYCOSIS.

According to Ernest Partsch, [131 Mar.] the human body shows the purest form of actinomycotic infection, and is affected only through the production of a granulation tissue, which is marked by softness, a tendency to bleeding, and fatty degeneration. The accompanying suppuration is brought about not by the fungus, but by the introduction of the streptococcus pyogenes at the same time. The parasite spreads from the original focus, forming indurations which

develop into tumors, and is stopped neither by fasciæ nor bones. It never propagates itself by the lymph-channels, but by destruction of the vessel-walls easily reaches the inner organs by the blood-stream. The swelling of the lymph-glands is of a purely inflammatory nature. Actinomycosis, as such, causes no lymph-gland metastasis. It differs in this from syphilis and tuberculosis. It does not tend to a dyscrasia. It is at first a purely local affection, and its extension depends upon the entrance of the poison into the blood-vessels. It is not hereditary, and may be classed among the chronic infectious diseases. The fungus lives as a parasite on grain, and fastens upon the teeth or tonsils, or enters the lungs. As to treatment, favorable results have been obtained where thorough surgical extirpation has been possible.

Lunsnitzer, $_{\text{Jan.4}}^{2}$ at the Society of Physicians of Buda-Pesth, exhibited a case of actinomycosis in man. The patient, aged 77, had suffered from cough for two years and vomited blood for several years. In June, 1889, he presented a painful swelling in the right axillary region, which, on being opened, gave exit to serous pus. In August several small abscesses formed over the sternum, and in three or four days burst spontaneously and showed no tendency to heal. Thick infiltrations and numerous ulcers with sharp edges were noted over the chest. The sound penetrated as far as the sternal bone, the cartilages of the ribs, and into the anterior mediastinum, while it could be introduced into a cavity 10 centimetres long, extending into the axilla. A similar cavity, 8 centimetres long, was found over the fourth rib. The ulcers exuded serous pus, in which very small bodies were visible with the naked eye. On microscopical examination they proved to be actinomyces. The patient had no fever, but he coughed a great deal and actinomycetes were found in the sputum.

Fessler $_{\text{B.9,No.8}}^{28}$ enumerates the following characteristics of this disease, as observed in 2 cases:—

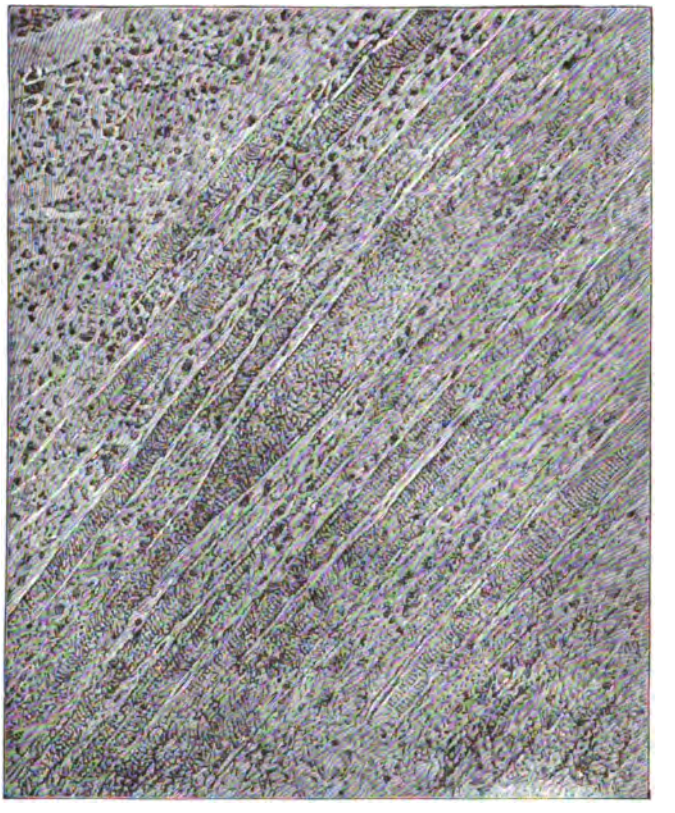
1. The course of the inflammation is sluggish and obstinate, without fever or pain. 2. There is considerable extension and induration of the inflammatory process. 3. When the disease has its seat on or in a bone, the latter and the soft parts are found closely adherent by means of thick strands. 4. Usually, in the course of weeks or months, a circumscribed special softening occurs, which discharges itself externally, without causing general

disturbing symptoms. 5. The discharge is scanty, blood-colored serum, eventually showing signs of glandular tissue. 6. Such a softened area cicatrizes quickly, the whole tumor receding somewhat, but growing again in the next few weeks. 7. Extensive destruction seems to set in late.

Albert, of Vienna, [61 Apr.19] says that actinomycosis can no longer be considered a rare disease, and that until now, from its frequent development in the lungs, it has often been confused with tuberculosis. Matlakowski [6 July 26] reports the case of a man in whom the disease was successfully eradicated by operative measure. The infection had taken place through a cavity in one of the molar teeth. The patient was still in good health two years and a half after the operation. Baracz [8 July 10] describes 4 cases occurring in the submaxillary glands. At the St. Petersburg Congress, Kernig and Anders [22 July 22] brought forward an instructive case of supposed sarcoma, where the post-mortem revealed chronic left-sided pyelitis, retrocæcal abscess, within whose walls was found a large, brain-like mass, which could not be admitted as a new growth, but was distinct from purulent matter; it was found to be connected with a like abscess in the thoracic wall. A granular matter was found in the abscess, which proved to be the ray fungus. Von Noorden [55 July 12] gives the report of 16 cases of actinomycosis treated in Tübingen since 1883 by operative measures, with the following results: 2 deaths,—1 not cured; 1 doubtful from want of subsequent information; and 12 cases in which the cure has persisted from one to six years. There were some extreme cases among the latter. Preusse also gives encouraging results from the surgical treatment; that is, 41 cures out of 45 cases treated.

Lührs [50 Jan.24] analyzes 21 cases treated in the Göttingen Clinic. In 13 cases the process had its origin in the teeth. In 2 cases, as the infection remained very superficial, the author supposed it to have originated directly through a wound in the skin. There were 2 cases of actinomycosis of the tongue, no doubt a carious tooth having mechanically opened the door for the local invasion. Two cases were of abdominal type, in which the cæcum was primarily infected. Finally, 2 interesting cases of skin actinomycosis, one occurring in the region of the knee and the other about the neck. Winiwarter [378 Apr.10] presented to the Medico-Chirurgical Society of Liége the second case of actinomycosis observed in Belgium. On

the right of the spinal column the patient presented an ulcerating surface, containing very many fistulæ, from which exuded a seropurulent fluid, some fistulæ finding their outlet even in the neighborhood of the umbilicus. The affection had progressed gradually during two years. Bujwid $\frac{61}{\text{Mar.21}}$ reports 7 cases observed by him in three years. The first case occurred in a young printer and his betrothed. The abscesses which had formed were incised,



MIESCHLER'S CORPUSCLES.
(*Annals of Surgery.*)

cleansed, and dressed antiseptically. Up to the present time, eighteen months after operation, there had been no return of the affection. The third case occurred in a chimney-sweep. In this case, also, the abscess was opened and scraped out, but from time to time the disease returned. The treatment should always be of a radical character. Byron $\frac{1}{\text{Dec.14,'89}}$ reports a case of actinomycosis of the pleura, saying that he had also observed this disease in a

case of prevertebral abscess, treated during several years for Pott's disease.

Altogether, about 42 cases have been reported from various sources during the past year, all presenting characters which formerly would have suggested the diagnosis of some form of tuberculosis, but which, from the well known mucoid discharges and the detection of the ray fungus, leave no doubt as to the nature of the disease; so that, as Albert, of Vienna, remarks, we must conclude that this affection is of much more frequent occurrence than we have heretofore suspected.

Etiology.—Gibbes [96 Feb.] describes the presence of Mieschler's or Rainey's corpuscles in actinomycosis. "They are cylindrical, tube-like bodies, found not infrequently in the muscles of the pig, ox, sheep, and mouse. They contain a great number of small, reniform bodies, not equally scattered, but in groups. (Their size is about 0.01 millimetre.) From a careful examination the author concludes that: 1. Rainey's or Mieschler's corpuscles are produced by the growth inside a muscle-fibre of the ray fungus of actinomycosis. 2. That the kidney-shaped bodies described by Leuckart are the rays of the fungus. 3. That the granular matter in which these seem to be imbedded is the mycelium of the fungus.

Cultivation.—The ray fungus is easily cultivated upon ordinary glycerin agar, according to Hammer. [8 May 8] It grows slowly in bouillon. Should the latter become turbid from germs of putrefaction introduced with the actinomycosis, they will soon form a deposit, and none but the actinomycosis will remain floating in the bouillon. In about two months the granules will unite and form a larger mass, or actinomycosis colony. As the fungi grow older the club-shaped extremities containing spores appear.

Max Wolff [41 Mar 20] demonstrated to the Berlin Medical Society the etiology of actinomycosis. He succeeded in obtaining good cultures on agar-agar. The first stage of their growth is in rods like bacilli. These rods then become elongated into fibres. In the animal disease club-shaped masses are formed, of which excellent examples were produced. The inoculation of a culture in agar-agar into the peritoneum of the rabbit resulted in masses of the same disease, varying in size from a pea to a walnut, with typical club-shaped appearance.

ANTHRAX.

In a very interesting article Blanc[12 July] states that he finds our modern anthrax to have been the disease of the Egyptian plagues. Hamlet, on the other hand,[1000 Jan., '99] thinks that this is a matter of speculation. Thirty-six cases of infection by the anthrax bacillus have been published during the year. Four are reported by Jacobi.[114 B.17, H.5] From them beautiful cultures were obtained and are reproduced in the colored plate shown herewith.

Explanation of the Plate.—Fig. 1. Ulcer of the stomach from case 1. Coloring of bacilli according to Gram. Second stain with Bismarck brown. Numerous bacilli in the blood-vessels and especially in the neighborhood of gangrenous spots. Magnified about 250 diameters. Fig. 2. Intestine from case 1. Same stain. Fig. 3. Subcutaneous gangrenous connective tissue from the forearm; numerous degenerating bacilli. Case 2. Gram's staining. Second stain with safranin. Fig. 4. Gelatin plate culture from the original culture; forty hours ordinary temperature. Fig. 5. Gelatin plate from the original culture after it had passed through the guinea-pig; forty hours at ordinary temperature. Methyl blue.

Bouisson[288 Dec., '99] describes the rare occurrence of intestinal anthrax without cutaneous lesions, only 5 such having been previously recorded. The patient was brought to the hospital complaining of pain in the abdomen, and vomiting of food and bile. A diagnosis of intestinal obstruction was made. Collapse soon took place, there having been no time to perform laparotomy. At the autopsy attention was directed to the intestines, which were found intensely congested. One knuckle was thickened and contained a thrombus about 20 centimetres long. The intestinal glands were enormous. There were neither ulceration nor gangrene. On examination the blood was found to contain the bacilli anthracis in great numbers.

The clinical diagnosis is always a difficult one, the case presenting symptoms of poisoning or of intestinal obstruction. The occupation of the patient may sometimes give a clue to the true nature of the case. When no malignant pustule exists, the bacillus finds its entrance through the alimentary or respiratory tract.

Woodhead and Cartwright Wood[3 Dec. 25, '99] show the antagonistic action of the bacillus anthracis and the bacillus pyoceaneus in the guinea-pig. The animals which were treated or protected by the *pyoceaneus* remained alive after being inoculated with anthrax. Arloing gives the following conclusions as to the loss of virulence in cultures of the bacillus anthracis: 1. In a given culture all

FIG. 2.

FIG. 3.

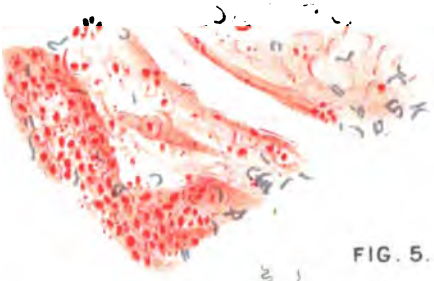
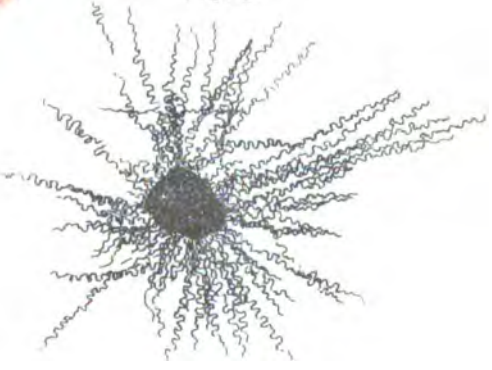


FIG. 4.

FIG. 5.



Cultures of the Anthrax Bacillus (Jacoby).

Zeitschrift für Klinische Medicin.

Buck & McFetridge Lith. Phila.

the bacilli do not possess the same virulence or the same growing power. 2. Age is felt first by the weakest bacilli; hence a culture soon becomes less virulent if abandoned to itself. 3. Fresh cultures must be constantly made to obtain crops of virulent bacilli.

E. Roux [282 v.4.No.1] has found that by cultivating anthrax in calf-bouillon to which phenol is added, he obtains a variety of the organism which does not subsequently form spores under any circumstances. The bacilli are just as virulent as those which have not lost their power. The amount of phenol used is about 6 to 10,000. Access of air prevents their losing spore-building power.

Treatment.—Apostoli and Laquerière [3 Apr.30] announce, as a result of their researches, that the continued current in medical doses (say, 50 to 3000 milliampères) has no particular action upon germ cultures in a homogeneous medium, and that microbes are killed only by the acids set free near the positive pole.

Lande describes 2 cases of malignant anthrax cured by the subcutaneous injection of carbolic acid into the tissues around the anthrax pustule. The strongest solution used when the symptoms were severe consisted of 15 grammes (4¼ drachms) of neutral glycerin and an equal part of distilled water, in which 3 grammes (¾ drachm) of crystals of carbolic acid were dissolved. The injections made at five different points around the anthrax represented 50 centigrammes (7½ grains) of pure carbolic acid. The solution caused intense pain, but rapid improvement of the symptoms. This 10-per-cent. solution was stronger than any previously employed for the same purpose by Boeckel, Raimbert, and others. Nevertheless, it does not appear to have caused sloughing of the tissues. A 5-per-cent. solution is strong enough, in the opinion of Lande, except in very severe cases where the patient feels little pain. The injections must be repeated until the bad symptoms cease to recur, which may be within forty-eight hours.

Voskresensky, of Ardatov, [25 Oct.] highly eulogizes the treatment of malignant pustule by large doses of carbolic acid. In the course of the last four years he used this method in 16 consecutive cases of a severe type. Notwithstanding that some patients presented themselves as late as the seventh day, the treatment was successful in every case. The drug was employed both internally and externally. Externally, a 2½-per-cent. solution—about 6 drachms (24 grammes)—of it was injected around the pustule and apparently

healthy zone, a 5- or 6-per-cent. solution around the margin of the lesion, and a 50-per-cent. deep into the middle of the pustule. On an average, 12 grains (0.78 gramme) of carbolic acid were introduced subcutaneously within ten minutes. In 10 cases the injections were repeated on the next or third day; in the remaining 6 any remaining injections proved superfluous. Internally, a solution of 4 to 8 grains (0.25 to 0.52 gramme) of the acid in 6 or 8 ounces (192 or 256 grammes) of peppermint-water; a tablespoonful every two or three hours for three days was given, an average individual dose being ½ grain (0.03 gramme), a daily dose 8 grains (0.52 gramme). All general symptoms—headaches, giddiness, etc.—disappeared after the first doses. Within one to three days the pustule was transformed into a benign abscess, all swelling simultaneously melting away without any unpleasant effect.

Arnoldoff[697 Aug.] successfully treats anthrax by deep injections of mercury and carbolic acid, according to the following formula:—

℞ Hydrarg. bichloridi, ... gr. ij (0.13 gramme).
Solution acid. carbol. (5 per cent.), . ℥j (32.00 grammes).
Sig.: Inject two syringefuls into the swelling once or twice a day.

The diseased region is disinfected by a 1-to-2000 solution of corrosive sublimate, and kept covered with a corrosive-sublimate gauze or compress soaked in a carbolic solution.

Barkoff[25 Apr.] warmly recommends the following plan of treatment: Having made a free crucial incision into the pustule, he cauterizes the wound with pure crystallized carbolic acid, and subsequently covers the part with a thick layer of gray mercurial ointment. He also orders the patient to make inunctions with the same salve around the pustule, repeating them three times a day. The daily dose of ointment should be less than 1 ounce (32 grammes). In addition he prescribes carbolic acid internally:—

℞ Acidi carbolici, ... gr. vj (0.40 gramme).
Aquæ destill., ... ʒiv (16.00 grammes).
Syrupi simpl., ... ʒss (2.00 grammes).
Sig.: A tablespoonful five times a day. Chlorate of potassium is added to prevent stomatitis.

Milot-Carpentier[f] also reports a case cured by the subcutaneous injection of sublimate solution, 1 to 4000. The pustule existed on the finger. Six injections were made and the treatment kept up eight days. Besides, a poultice of sublimate was constantly kept on the parts. The cicatrization was complete in fifteen days.

SURGICAL DISEASES.

By LOUIS McLANE TIFFANY, A.M., M.D.,
AND
RIDGELY B. WARFIELD, M.D.,
BALTIMORE.

HYDROPHOBIA.

ALTHOUGH hydrophobia continues to excite the scientific interest of the whole world, and although it is constantly made the subject of careful research by the most capable observers, we cannot record for the last twelve months much distinct advance in our knowledge of the disease.

In recent literature the subject has been considered from every stand-point, and independent investigations have been made in every part of the globe. Still, as every point advanced is followed by rapid denial, it is difficult for the reviewer to properly measure the importance of existing evidence, and to bring any sort of order out of such chaos. The disease remains most perplexing. This much, however, seems established: that, although up to this time the germ of hydrophobia has not been discovered, it can no longer be doubted that the disease is a microbic one. As expressed by Senn[1081, p.406]: "At the present time we can safely assert, without fear of contradiction, that the essential cause of this disease is a specific virus, which can only be reproduced within the living organism. As a small quantity of this virus introduced into the tissues can result in the most serious consequences, there exists no doubt that it possesses the properties pertaining to living organisms, more especially the capacity of reproduction after its entrance into the body. That the disease is not caused by preformed ptomaines communicated from the saliva of rabid animals is shown by the variable and, on the whole, long stage of incubation which precedes all true infective processes. Another convincing proof of its microbic origin is the well-established fact that the disease can be artificially produced by implanting fragments of brain- or cord-

tissue, taken from animals dead of rabies, into healthy animals." Senn also expresses the opinion that since, clinically and pathologically, the disease so strongly resembles tetanus, its microbe probably possesses analogous pathogenic properties to the bacillus of that disease, and that the actual development of hydrophobia follows the action of the germ-produced ptomaines on the central nervous system.

Concerning the value of preventive inoculations in hydrophobia, as practiced by Pasteur and his followers, all shades of opinion are expressed, from the most enthusiastic acceptance of the theory to grave doubt or even positive denial of its efficiency. The statistics from the Pasteur Institutes indicate, apparently beyond reasonable question, that many lives are annually saved by means of the antirabic injections; while from other sources evidence is not wanting to show that the death-rate by their use is in no way lessened, or even that "rabies increases *pari passu* with the erection of institutes intended to prevent it."

One of the advocates of the injection theory, Buchanan,[213 Jan.] in an address before the University Medico-Chirurgical Society in Glasgow, reviews the subject of hydrophobia, and describes in detail the methods of treatment employed in the Pasteur Institute in Paris. He quotes from the report of the well-known committee appointed by the English government to investigate the subject, ending with the statement that the inoculations practiced by Pasteur on persons bitten by rabid animals have prevented the occurrence of hydrophobia in a large proportion of those who, if they had not been so inoculated, would have died of that disease. He further says: "From such conclusions, formed by such a committee after the most careful investigation, it is impossible to escape, and their verdict must be accepted without reservation."

Buchanan is also an advocate for muzzling dogs, believing that in this way, by proper legislative interference, the disease may be effectively stamped out. This point, which year by year attracts considerable attention, is still quite unsettled. The fact, however, remains that in countries where muzzling is generally enforced rabies is practically absent.

Some interesting points were brought out in a discussion on hydrophobia at the New York Academy of Medicine in October.[1 Nov. 8] L. C. Gray raised the old question as to the very existence of such

a disease, saying that the extreme variability of the period of incubation and the many cases of reported hydrophobia proved to be spurious lent credence to such unbelief. He thought that the so-called dumb rabies was only a symptom of some form of meningitis, and that, at most, but very few cases of the real disorder had been observed in New York or the country at large. He further said that, although such a belief had been considered childish, it was a clinical fact that great psychical shock could produce mental disease and death.

C. L. Dana expressed the opinion that the scientific work of Pasteur, confirmed by many other investigators, had established experimentally the fact that rabies was a specific disease, and that the hydrophobia of man was identical with rabies in the lower animals. These points had been further proven by etiological, clinical, and anatomical investigations. As to the question, Could the immunity to rabies, which it was known could be conferred upon dogs, be conferred upon man? there was, in the author's opinion, "no experimental method, no pathological fact, and no prophylactic measure more firmly established than that anti-rabic inoculations could be successfully applied to man." That much is still to be learned about rabies is clearly shown from the fact that approximately the same results may be obtained by the vastly different methods of injection employed by Pasteur, Ferran, and others. The author does not accept the statistics of Pasteur as to the relative mortality after the inoculations, but he thinks it shown that by Pasteur's method some immunity can be conferred on rabbits and probably also on human beings.

H. C. Ernst, of Boston, in the same meeting, said that he regarded the results accomplished by Pasteur as among the greatest achievements of modern medicine. Once a doubter, he had, after a series of inoculation experiments, become converted to a thorough acceptance of the injection theory. There was nothing more certain in medicine than the unerring precision in the results obtained by the inoculation of the cord emulsions under the dura of healthy rabbits. Although a constant pathognomonic lesion for rabies had not been proven, the very uniform white-cell infiltration of the minute vessel-walls in the medulla, the engorgement of the veins, and the occasional circumvascular hæmorrhages were most suggestive.

Gray thought that the discussion in this meeting had gone far toward proving (1) that there undoubtedly existed in the lower animals a disease known as rabies, possibly made up of several diseases, due to different micro-organisms; (2) that this disease was more frequent in the lower animals than a similar disease in man known as hydrophobia; (3) that, while this so-called rabies in animals occurred very often in this country, it occurred less frequently in the human being; (4) that very few medical men had seen genuine cases of hydrophobia; (5) that cases of pseudo-hydrophobia were by no means uncommon, and that death could result from the condition; and (6) that there still existed considerable diversity of opinion as to the value of Pasteur's method, which would furnish material for discussion and incite to further experiment.

In this country much attention has been directed to the new Pasteur Institute in New York, established early in the year as a branch of the Paris institution, and put under the care of Paul Gibier. 59 760 Oct. 4; Oct. 11

We gather from his report that during the first eight months in the history of this institution 610 persons had applied for relief at his hands, coming from widely different parts of the United States. Of this number only 130 were put under treatment, it having been shown in the rest that the attacking animals had not been mad. At the time of the report all of those to whom the antihydrophobic treatment was given were enjoying good health. Those only remained for treatment who had received wounds from animals proven to have hydrophobia by veterinary examinations, by inoculation in the laboratory, or by the death of some other persons or animals bitten by the same dogs.

To the insinuation that preventive inoculations may themselves be capable of conferring rabies Gibier gives an emphatic denial. He says, in substance, that 10,000 people have been inoculated in Paris, and that of this number about 50 (1 to 200) have died, notwithstanding the treatment. From the bulbar nerve-matter of these individuals repeated inoculations into rabbits have been made, with the effect of causing death in from eighteen to twenty days, exactly as happens when virus is taken from the common mad dog. Now, if they died from the preventive inoculations, the intra-cranial insertions would have killed the rabbits in a period

ranging from nine to eleven days, as always occurs when the powerful virus employed at the end of treatment is used. "These people, therefore, were not killed by the virus of injection, but by that of the animals that had bitten them."

He cites, as another proof that Pasteur's inoculated patients did not die from the treatment, that the five people who died after the injections by Bareggi, of Milan, who followed the method of Ferran, presented symptoms differing altogether from those observed in Pasteur's patients.

In the discussion on Gibier's paper before the last Congress in Berlin, the efficacy of the treatment was unanimously conceded, and it was only upon details and certain modifications connected with the method of inoculation that the subject received comment. Among several interesting observations recorded at that time was the following by Babes: "In the environs of Bucharest a mad wolf bit 13 people and 30 domestic animals (oxen, horses, pigs, and dogs). The 30 animals died of rabies; 1 of the men, who had neglected to have himself inoculated, acquired hydrophobia and died also. Another man died from the traumatism inflicted by the wolf, but the other 11 people, who received inoculations in the Pasteur Institute of Bucharest, are now, after two years, in excellent health. Some recently-published comments[19] on the results obtained under Gibier's treatment, although depending largely on newspaper reports for their collection, seem to modify to some extent his published statements. In fact, argument against the Pasteur theory does not seem, in any way, to diminish. We had, on the authority of the well-known Peter,[21] that, so far from being lessened, the number of deaths from hydrophobia in France has actually increased since the establishment of the Paris Institute. In the same line, Dujardin-Beaumetz[24] records, in his report to the Prefect of Police, that for the year 1889, in the Department of the Seine, 6 deaths occurred from hydrophobia, 3 in persons who had undergone treatment in the Pasteur Institute and the other 3 in those who had received no treatment whatever. He maintains that Pasteur's inoculations do not prevent the disease, and insists, as of more importance, on the rigid enforcement of the law in reference to stray dogs.

A careful histological examination of the central nervous system of a man dead of hydrophobia has been recently made by

Popow, of Warsaw.[530 Nov.] He found in the nerve-fibres, especially in the cord, a series of varicose inflations, due apparently in the early stages to an unequal swelling of the myeline substance, the axis-cylinder remaining intact, while later the enlargement seemed to result from hypertrophy of the cylinder itself. The cells were found generally affected in both protoplasm and nucleus. In the protoplasm granules of yellowish-brown pigment were found, either collected in masses toward the poles or around the nucleus of the cell. In some cases the whole cell seemed filled with pigment, and was rounded and irregular, losing its normal characteristics. The change in the nucleus was of a similar kind. Those affected were of irregular shape and granular. In some instances the nucleus had entirely disappeared, leaving only its nucleolus surrounded by irregularly-scattered granules.

The cellular changes were most marked in the anterior horns of the lumbar and cervical regions of the cord, in the motor nuclei of the medulla, in the posterior limbs of the corpora quadrigeminus, and in the frontal and para-central lobes of the brain. The enlargement of the intercellular spaces, first pointed out by Schaffer, was apparently not present in this case. Popow agrees with Schaffer that the lesions are of an inflammatory nature. He thinks, also, that the hydrophobic virus attacks by preference the motor centres of the brain and cord.

Richard Mollenhauer,[242 Sept.] in a paper read before the American Neurological Association, in June, exhibited some microscopic specimens of a germ taken from a dog which he had succeeded in rendering rabid by inoculation. The germ was a bacillus whose various growth-stages were of a uniform type. "In its adult period it was usually found in chains typically made up of four, rarely of three, somewhat more frequently of two, and exceptionally of five links." He notes the fact of the great difference between cerebral and hypodermatic inoculations with the same material. In his own experiments aseptic cerebral inoculations with the specific material always killed in a period of from six and a half to nine and a half days, while the same substance used subcutaneously was usually without result. He thinks it probable that the manifestations of rabies in the dog may be symptoms of various diseases, and, further, that the bacillus he describes may, at least, produce a disease clinically undistinguishable from the rabies

of veterinarians. The germ in question he has found swarming in the parotid glands of rabid animals, whence the probable infection through a bite is obvious.

Two Italian observers, Blasi and Travali, have recently made a number of experiments as to the effect of various chemical substances on the poison of rabies. They subjected pieces of the virulent spinal cords of animals, dead from the disease, to different drugs in solution, or, if it were insoluble to the drug itself, in powder. Subsequently, the cords so treated were broken down into emulsions and injected into the peritoneal cavities of guinea-pigs. In this way they determined that the rabic poison was extremely sensitive to the action of caustic and antiseptic substances. In the order of efficacy, they place creolin and citric acid first, and afterward solid nitrate of silver, sulphate of copper, salicylic acid, hydrochloric acid, and perchloride of iron. Other agents, such as sulphate of zinc, permanganate of potash, iodoform, ammonia, sulphuric acid, camphor, and boracic acid, proved less powerful.

Up to this time it has been generally believed that an animal could not transmit the poison of rabies to another animal, or to man, until it had itself developed positive symptoms of the disease. Roux and Nocard, 262 Mar. in Pasteur's laboratory, have recently attempted by experiment to determine the earliest time when such infection is possible. They give, as the result of their work, the rather startling information that infection is possible from an apparently sound animal as much as three days before symptoms of the disease appear. That hydrophobia may develop from the bite or even the caress of an animal in the best of health and with the best of tempers is an uncomfortable and important addition to our knowledge of the disease.

Lucas Benham, 6 Mar. 1 to 15 in a series of articles, reviews carefully 50 cases of supposed hydrophobia which have been recorded from time to time as having ended in recovery.

In the treatment of these cases vigorous bleedings and the use of mercury to salivation held first place, although the narcotics generally and vapor and cold-water baths were also employed. Many of the cases were reported early in the century, and the accuracy of the diagnosis is, to say the least, questionable. While it is, of course, desirable to combat this formidable disease by all means in our power, we think it more than doubtful that a cure

has ever followed a genuine case of hydrophobia in man when once fairly developed.

TETANUS.

Although doubt still exists as to whether one single germ is invariably the actual cause of tetanus, and the exact nature of the disease cannot yet be considered as positively known, its infectious character is now conclusively settled. The results accomplished in the last few years have established beyond reasonable contradiction not only the fact that the disease may be produced by inoculations into animals of pure cultures of the germ of tetanus, but that tetanus is clearly a microbic disease, with the bacillus of Nicolaier and Rosenbach as its essential cause. Indeed, the most important problems remaining now to be solved seem rather to refer to the chemical products of the bacillus and the processes by which, after infection, the disease becomes manifest in the organism. Besides this, more light is especially needed on the important subjects of prophylaxis and treatment in this formidable disease.

Since Nicolaier, in 1884, found in superficial soil the pin- or brush-shaped bacillus which now bears his name, and by subsequent inoculations produced tetanus in animals, and Rosenbach, a few months later, obtained a like germ from the wound-secretion of a patient with tetanus, the chain of evidence as to the real nature of the disease has been gradually formed, the last essential links being added from Koch's laboratory by the Japanese student, Kitasato.[1082] To this brilliant observer all credit is due, since he not only first isolated the germ and by inoculation with pure cultures produced the disease in animals, but also established the identity of the soil bacillus with that obtained by Rosenbach from the wound of a patient with tetanus. The method by which Kitasato obtained pure cultures of the germ has already become classical. By this and by other methods different observers have since accomplished the same end. According to Kitasato, the tetanus bacilli produce spores in thirty hours in cultures kept at a temperature of the body. At this time the bacillus is swollen and usually bulged at one end by the contained spore. When not bearing spores the bacillus is a straight, stiff rod of varying length and with rounded ends. The spore itself is not obviously peculiar; it stains badly or not at all, and is small and round, or oval.

The germ of tetanus is strongly anaërobic,—a fact which ex-

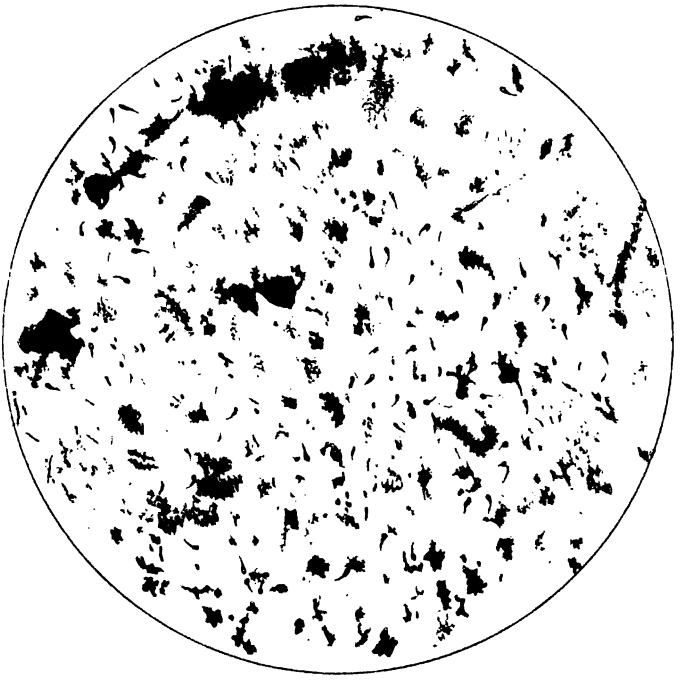
plains many of the failures of its attempted cultivation. It lives through a wide range of temperature, resisting well both heat and cold. Its spores remain alive after exposure, from half an hour to to an hour, to a temperature of 80° C. (176° F.). They are destroyed after five minutes' stay in a sterilizer at 100° C. (212° F.).

Besides elaborating and fixing points already gained, the work of the past year has been marked by some real advance in our knowledge of tetanus. One of the most interesting articles presented is that of Theo. Kitt, [50] of Munich. He accepts the pure cultures of the germ obtained by Kitasato, and independently by Bucher, as making complete the doctrine concerning the etiology of the disease, and describes in detail his own experiments on the effect of pure cultures of the tetanus bacillus on horses, sheep, and dogs. A portion of the dried pus obtained from an abscess in the hoof of a horse which had died of tetanus was ten times diluted with sterilized water, and 2 cubic centimetres (32½ minims) injected subcutaneously into the neck of a horse. From September 21st to October 9th the horse remained apparently well; then symptoms of tetanus came on, the animal grew rapidly worse, and died at midnight October 10th. The symptoms were those of tetanus in horses, notably the peculiar facial expression of horses with locked-jaw and the dilation of the nostrils. Still, as the horse was old and worn out, and the disease ran such an acute course, it was necessary to have more proof that it had succumbed to inoculation tetanus and to nothing else. The autopsy done on October 11th furnished this proof.

No special organic lesions were found, but from the area of diffuse redness under the point of inoculation some liquid was scraped with an aseptic knife, and 9 white mice were each inoculated in the subcutaneous tissue of the hips with an amount of the material varying from ⅛ to ¼ grain (0.0081 to 0.016 gramme). All had tetanus by the 14th, and all died,—2 on the 15th, 5 on the 16th, and 2 on the 18th. Other mice, inoculated with blood from the heart and œdema liquid from the pharynx, remained healthy. He did not find the characteristic germ with terminal spores either in the juices at the point of inoculation or in the pus from the hoof of the first horse. The pus contained masses of cocci and single bacilli of the shape of the sporeless form of the tetanus germ. In the mice, however, he found several times the pin-shaped bacillus partly provided with spores. Kitt had tried without definite suc-

cess many culture experiments with different media; but, finally, when Buchner's method of cultivating anaërobic fungi became known, these were repeated, and he succeeded in obtaining mixed cultures in blood-serum of material taken from points in mice inoculated with dried pus from a horse. These were virulent to the third generation. Finally, "by extreme dilution with sterilized water, and with linear inoculations in blood-serum from the horse and sheep," he obtained pure cultures without the aid of the heating process. The morphology and growth of the tetanus bacillus occurring in the horse agree, on the whole, with Kitasato's description of that in human or soil tetanus. Kitasato's cultures in blood-serum were not liquefied. The tetanus bacillus of the horse, as well as those from the pure cultures from the soil, effected in Kitt's hands uniform alteration in the blood-serum accompanied by partial liquefaction. The serum cultures were found to be very virulent. Kitt inoculated a horse and 2 dogs, all of which died rapidly of tetanus. Later, 2 sheep were inoculated with diluted virus and typical tetanus produced in each case. Three doves were tried, and 2, having the virus applied to denuded surfaces, remained alive; the other, inoculated with $\frac{1}{8}$ cubic centimetre (2 minims) in the pectoral muscles, died in two days, tetanic. Kitt concludes that tetanus of the horse is caused by bacilli which resemble the bacilli of human tetanus and soil tetanus described by Nicolaier, Kitasato, Buchner, and others; that it is possible to obtain pure cultures without heating when the primary material is not too seriously contaminated with other bacteria, and Buchner's method of cultivating anaërobes is employed; further, that dried pus which contains spore-bearing tetanus bacilli retains its virulence from four to sixteen months, and at first seems to be a transfer of pure cultures to the horse, sheep, and dog, resulting in a typical attack of tetanus.

Paul B. Bossano,[46] whose work in the examination of various soils for the presence of the Nicolaier germ had already attracted attention, has produced an elaborate article on "Experimental Researches on the Nature of Tetanus." He divides the history of such research into three epochs: 1. The work of Nicolaier's predecessors as to the possibility of the transmission of tetanus from man to animal or from animal to animal. 2. That of Nicolaier and his successors proving the existence of the tetanic



Tetanus bacillus (Nicolaier).
Journal de Médecine de Bruxelles

& Mr Fetridge, Lith. Phila

germ in the soil, and the possibility of producing tetanus by earth or wound inoculations. 3. The discovery of the means of isolating the germ by Kitasato, "which has negatived, for the most part, serious arguments against the theory of the infectious nature of tetanus." Continuing his inoculation experiments with the soil of different countries, he has obtained interesting results. He secured soil from forty-three different countries from many parts of the world, and inoculated 96 animals with different specimens, some, of course, from the same country. The earth of twenty-seven countries gave positive results. Thirty-nine animals died tetanic and 16 others succumbed during the course of the inoculations, 9 without definite symptoms and 7 with symptoms more or less tetanic, but with the disease not positively marked. N. W. Petroff,[571] after failing with the method of Buchner to obtain in the pus from a patient with tetanus pure cultures of the germ, afterward succeeded, by means of heat, in securing an uncontaminated culture; this, injected into mice, produced characteristic tetanus.

Widenmann[118] reports a case of tetanus in a child following a wound in the cheek as the result of a fall on ground covered with horse-manure. On the sixth day after the accident a splinter was withdrawn from the wound. Six days later tetanus developed, with death on the fourth day. The author inoculated mice and rabbits with splinters of wood taken from the wound, and with soil taken from the place where the fall occurred. In each case he obtained typical experimental tetanus.

Pla, of Havana,[459] says that among 4323 children born in 1889, 343 died of tetanus. This enormous mortality he thinks due to the use of water from the river Zanja as a dressing to the umbilical wound. The river in question flows through a richly-cultivated country and conveys quantities of drainage from certain quarters.

Verhoogen and Baert,[276] in the Laboratory of Physiology at the University of Brussels, have carefully considered experimentally the whole subject of the nature and etiology of tetanus and give the following conclusions: 1. Tetanus is a specific infectious disease. 2. Outside of the diseased organism the specific germ may develop in the soil. 3. In addition, it may exist at different points,—on the coats of horses or other animals, in the dust of hay, on surgeons' instruments, etc. 4. These different

situations (soil, dust, horse, and man) constitute a closed cycle, from any element of which the bacillus may constantly or indefinitely emigrate, so that it is not possible to designate the point of initial departure. 5. The horse plays, in this transmission, no greater rôle than cattle in the propagation of tuberculosis.

The observations of Sormani $\frac{589}{\text{No.95,'99}}$ on the action of the gastric and intestinal secretions on the bacillus of tetanus deserve mention. He caused herbivorous and carnivorous animals to swallow pure cultures of the bacillus and also fed dogs and rats with the flesh of animals that had died of tetanus. In some of these experiments the gastric juice was allowed to remain normally acid; in others it was neutralized by carbonate of soda. His conclusions are: 1. The flesh of animals that have died of tetanus can be eaten with impunity. 2. The microbe of tetanus can pass through the alimentary canal of herbivorous and carnivorous animals without causing any symptoms. 3. The digestive secretions of these animals neither kill or alter in any way the bacillus of tetanus. 4. An animal can introduce into its stomach with impunity a dose of tetanic virus two thousand times greater than that which is sufficient to kill if injected subcutaneously. 5. These facts throw some doubt on the theory that the symptoms of tetanus are due to the absorption of poisonous alkaloids secreted by the bacillus. 6. The fæces of animals may be a not insignificant agent in the distribution of the tetanic poison.

Sanchez, Toledo, and Veillon, $\frac{8}{\text{Oct.15}}$ in a recent article, confirm Sormani's statements, and note the presence of the bacillus in the excrements of perfectly sound horses and cattle. The spores of the germ, like those of Pasteur's "vibrion septique," resist the action of the intestinal secretions, and re-appear in the fæces with all their virulence. In the line of attempting to secure immunity toward the action of the tetanic poison, by chemical inoculations of vegetable substances, the recent observations of Peyraud $\frac{188}{\text{Aug.3,10}}$ are interesting. This investigator obtained a virulent material from soil taken from a wine-cellar, where horses had never been, and which had never, in any way, been cultivated. From this substance tetanus was produced by every inoculation, 5 animals out of every 6 dying of the disease. Later, acting on the theory that strychnine produces many symptoms similar to tetanus, Peyraud undertook a series of experiments to determine whether an animal,

protected by strychnine, could resist at all the tetanic poison. Ten rabbits were each, once daily for five days, inoculated with the drug in solution. Enough strychnine was used to produce distinct symptoms. These inoculations from the wound-tissue of an animal with experimental tetanus (from the cellar-dirt) were made, and the wounds carefully closed. Four test rabbits and 3 of those protected with strychnine died. In a second series, with tetanic virus from another locality, 7 prepared rabbits and 14 test rabbits were inoculated six days after the strychnine injection had been stopped; 13 of the test rabbits and 4 prepared animals died. Further inoculations of tetanic earth were made later on in rabbits prepared at the Laboratory of Physiology of the Faculty of Medicine. The following result is reported by Denucé [188 Aug.17]: the mortality in the prepared animals amounted to only 22.5 per cent., while of those not protected 80 per cent. died. Denucé considers that the obtained results "show that strychnia vaccinations give to animals a considerable resistance against the virus of tetanus, and offer strong argument in favor of the theory of protective inoculations advanced by Peyraud." A committee appointed to investigate Peyraud's work could not substantiate the results obtained by that observer. According to Nocard, [3 Oct.8] the reporter, in their hands, 0.6 of a milligramme ($\frac{3}{320}$ grain) of strychnia sulphate, injected daily for five days, did not protect a single one of 8 rabbits against the action of a pure cultivation of the bacillus of tetanus. They were killed as rapidly and with the same symptoms as 8 test rabbits. All died in from three to five days. Finally, thinking that the dose of strychnine might be too small, they tried 10 more rabbits, killing 2 with the strychnine. On the sixth day the 8 prepared rabbits and 4 test rabbits received 10 drops of a pure culture of the bacillus, with the result that the whole 12 were dead in five days. They consider that the most important feature of Peyraud's work was the demonstration by him of the presence of the Nicolaier bacillus in non-cultivated and undisturbed soil.

Positive advance toward the production of immunity against tetanus seems very recently to have been made by researches in Koch's laboratory by Behring and Kitasato. [69 p.1113] These two observers have been engaged for some time in a study of the nature of diphtheria and tetanus, and they have at length succeeded in not only conferring immunity in animals against attacks of either

disease, but also in arresting the disease after it has already set in. They have succeeded in giving animals complete immunity against tetanus, both against the living organism and the produced poison. The manner in which such immunity is produced has not yet been explained, but without ill effects rabbits have been made to withstand twenty times the dose of the tetanus poison sufficient to kill test animals. The blood of a rabbit so protected, which had withstood the inoculation of tetanus, was found to confer, in turn, immunity to mice when injected into the peritoneal cavity, and followed after twenty-four hours by inoculations of virulent cultures. The importance of this discovery can scarcely be overestimated, and, although the method of obtaining such startling results has not been published, the following proposition is presumably correct: "The immunity which can be conferred on rabbits and mice against tetanus depends on the power possessed by the serum of the blood to render innocuous the poisonous products formed by the tetanus bacilli." Behring and Kitasato sum up their results as follows: 1. The blood of rabbits rendered immune against tetanus possesses bacteria-killing properties toward the tetanus bacillus. 2. These properties belong also to extra-vascular blood and to the serum obtainable from rich blood. 3. These properties are of such a durable nature that they remain active even in the bodies of other animals; so that it is possible to obtain good therapeutic results by the operation of serum or blood transfusion. 4. These properties are entirely absent from the blood of such animals as are not immune against tetanus; and when the poison of tetanus is introduced into these animals it is found after death in the blood-fluids of the body.

As to the rôle played by produced ptomaines in tetanus, it is now evident that the filtrate from pure cultures of the germ, when subcutaneously injected into animals, will cause the disease, but the exact nature of the poison is not yet known. Acting on the suggestion of Rosenbach, that some poison produced by the germ caused the peculiar symptoms of tetanus, Brieger, by his untiring work, isolated four distinct toxic substances from mixed cultures of the tetanus bacillus in sterilized emulsion of meat. These four substances, tetanin, tetanotoxin, muriate of toxin, and spasmotoxin, are now matters of history. More recently, Brieger has succeeded in isolating tetanin from the amputated arm of a patient

with tetanus; the other poisons were not found. The tetanin inoculated into the subcutaneous tissue of a horse produced muscular contractions lasting for a considerable time, but the characteristic symptoms of tetanus in a horse did not appear. As supplementary to Brieger's study of ptomaines in tetanus, the results of Knud Faber's investigations[4] may be mentioned. This observer endeavored to isolate the bacterium of tetanus, but failed to secure a pure culture; at best, two bacteria were cultivated together. Inoculations of these cultures invariably produced tetanus. They were obtained both in pus from tetanic patients and in the earth. In 23 specimens of earth examined, 16 contained these germs. They could not be found far below the surface and were absent in a specimen from a forest. From a sample of earth an exceedingly virulent culture was obtained which always produced true tetanus on inoculation under the skin or in the veins of animals. He thinks the poison is not the tetanic of Brieger, that it is not an albuminate body, but more closely related to the poison of diphtheria than to the ptomaines proper.

While up to this time no agent has been found upon which we can depend for successfully combating tetanus, with the beginning of this year comes also the hope that at a period not far distant we will have a comparatively certain means of overcoming the disease. If the recent observations of Behring and Kitasato can be substantiated, which now seems likely, we will have to record another victory over disease achieved by knowledge of its actual cause, and the employment by inoculation of substances which have for their object the destruction of that cause. The nature of the material used by Behring and Kitasato has not yet been published, but it is strongly probable that it is of animal origin and perhaps bears relationship to the already far-famed antitubercular lymph given to the world from the same laboratory. So far, inoculations against tetanus in the human subject have not been made, but the discovery of a substance which, injected into animals, enables them to withstand with impunity a dose of tetanic poison many times greater than that sufficient to kill a sound animal is, to say the least, suggestive and encouraging. Meanwhile, throughout the year, reports of recovery from the disease following the use of various agents have been recorded. Among the drugs most extolled may be mentioned the bromides and chloral, either alone

or combined; bromidia, gelsemium, antipyrin, paraldehyde, etc., all of which have more or less enthusiastic supporters.

In the line of local treatment directed toward the wound, we note from Lockwood [2 Oct. 26] the statement that various "observations seem to show that tetanus may at first be a local disease, thus favoring vigorous treatment at the point of inoculation." From the same stand-point, Marchisio [24 June 8] observes that in whatever way the tetanic symptoms are brought about, whether from the bacteria themselves or from the produced ptomaines, the disease is at first local, and active treatment should always be directed toward destroying the initial foci of infection. With this object he has employed successfully, in a case of fully-developed tetanus, excision of the infected area and the subsequent application to the wound of strong and long-continued sublimate baths. Toward the same end, in cases ending in recovery, Bidder, [69 Mar. 13] Povlini, [589 No. 9] Baccelli, [589 Jan.] and others have used about the injected area subcutaneous injections of carbolic acid of various strengths. Tizzoni and Catani, [589 Apr. 10; 22 June 4] in a large number of experiments with different chemicals to determine their effect on the spores and germ of tetanus, conclude that against this germ nitrate of silver has the most power, and that it should be used on primary wounds. In the strength of a 1-per-cent. solution the spores were destroyed in one minute. In their hands iodoform and iodol, after twenty-four hours of direct contact with the germ, had not affected their vitality. In contrast with this, Sormani [589 Jan. 13] records, as the result of experiment, that iodoform is especially to be recommended as a wound dressing in tetanus, and that it neutralizes perfectly the poison of the disease.

GANGRENE.

Our knowledge of the exciting causes by means of which the various phenomena attending gangrenous processes in the body are brought about is becoming gradually more definite. Recent investigations have had for their object the consideration of the many perplexing problems of bacterial agency in such conditions, and much room for further research in the same direction still exists. The death of tissue *en masse* is not, of course, always associated with bacterial invasion. For example, parts becoming necrotic from exposure to excessive heat or cold, or other caustic influences, remain aseptic until infected from without; but, nevertheless, as a

rule the gangrenous process is much encouraged and advanced by the part played by various micro-organisms.

With the growth of antisepsis in surgery, the death of an extremity following the application of a ligature to the principal artery is almost unknown,—an evidence that not so much from the inhibited blood-supply itself does the gangrene result as from the attendant septic inflammation, which hinders or prevents the establishment of adequate collateral circulation.

In coagulation necrosis, a condition closely allied to the so-called hyaline or fibrinous degeneration, although the part played by chemical processes is not yet clearly established, according to Senn, "there can be no doubt that this form of necrosis is nearly, if not always, of mycotic origin, and it must be regarded, practically, in the light of a bacterial necrosis."

Only moist gangrenes are putrefactive, and, as a rule, the general systemic involvement bears a relationship to the nature and extent of the infection with saprogenic organisms. Such forms of necrosis which do not depend on the presence of putrefactive organisms are not attended by foul odors or by other evidence of putrefactive changes. Putrefactive germs feed on dead tissue and require moisture for their development and growth.

Rosenbach has cultivated, from 2 cases of emphysematous gangrene, a peculiar spore-bearing bacillus, while other investigators have obtained from putrefying materials one or more varieties of the proteus micrococcus, as well as other forms of bacteria. In the field-mouse, an animal immune to the bacillus of septicæmia, Koch has produced, experimentally, a progressive gangrene from inoculations with chain micrococci not to be distinguished from the streptococcus pyogenes. Continuing his work, he has shown that the ptomainic products of bacterial activity may themselves cause the destruction of tissue, since, in the examination of specimens from the inoculated animals, the progressive necrosis was observed markedly in advance of the bacterial invasion. Indeed, certain chemicals have the power of causing cell destruction, independently of their tendency toward producing inflammation and quite apart from bacterial influence. Gas-producing bacteria differ from those which are saprogenic in character. When to a necrotic process in the economy there is added a rapidly-spreading emphysematous condition of the surrounding parts, with increased tension, crepita-

tion, the formation of gaseous bullæ, and a bronzed and streaky discoloration of the skin, an emphysematous gangrene is said to be present. Since the disease, once established, tends to spread rapidly to other parts of the body, being the most fatal form of gangrenous trouble, it has been called by the French *gangrene foudroyante*, and has been otherwise designated by various writers.

With the general advance in our knowledge of the infective wound processes, some definite information has been gained concerning the essential causative agents of this formidable condition. Some years ago, Pasteur observed in the serum from the peritoneal cavity or from the bruised muscular tissue of animals dead from septicæmia, an elongated, movable organism which he cultivated and inoculated, and finally named vibrion septique. More recently, an experimental condition has been produced in guinea-pigs and rabbits (Koch, Gaffky, etc.), to which Koch has given the name of malignant œdema, and the germ which he describes seems identical with Pasteur's organism. Finally, through the experimental observations of Chanveau and Arloing, Brieger, Ehrlich, and others, the fact has been practically established that the same germ which, on the one hand, may give rise in animals to malignant œdema, may, on the other, when engrafted in man on tissue the seat of a moist gangrene, produce the emphysematous condition which we have just described. The degree of gas-generating power in some other bacteria has still to be defined, and at this time the invariable importance of the vibrion septique in the production of emphysematous necroses cannot be conclusively established.

The organism in question resembles the bacillus of anthrax; it is anaërobic, of variable length and thickness, and is usually found in the form of rods made up of several bacilli joining end to end. The bacillus multiplies by spores, which are found either in the middle or at the ends of the germs. The cultivation of the organism is only affected by the exclusion of oxygen. By Pasteur this was accomplished in an atmosphere of carbonic-acid gas, and since his investigations various observers have obtained pure cultures by different methods.

The bacillus is widely diffused, being found generally in putrefying substances, in the superficial soil, and in the dust of hay. Substances containing it, when inoculated under the skin of guinea-

pigs, produce death in from twenty-four to forty-eight hours. At the autopsy a subcutaneous œdema is observed, beginning at the inoculated point. The œdema liquid is reddish and transparent and contains many germs, while in the connective-tissue spaces numerous gas-bubbles are found. The internal organs are not much changed, although the parenchymatous fluids contain the germ. According to Chanveau and Arloing, immunity is produced against the organism in those animals which withstand the inoculations.

Chapplain, of Marseilles, $\frac{3}{\text{Aug.17}}$ has during the year expressed the opinion that gaseous gangrenes may be of different kinds, with distinct pathological lesions, and calling for different forms of treatment. He speaks particularly of 2 cases, one ending fatally in twenty-four hours, with general emphysema of the connective tissues, the other dying after six days. In this last case the gas was found only in the veins of the extremities, in the iliac, in the ascending cava, and in the right heart. He says that the course of the disease depends on the method of introduction of the poison. When this occurs through the connective tissue, its spread is unlimited and rapid; when through the vessels, the gaseous invasion only slowly extends beyond the confines of the extremity.

Reboul $\frac{152}{\text{Apr.20}}$ has recently reported an interesting case of gangrenous septicæmia, occurring in a man of 20 years, and following an ugly wound on the left leg from a blow with a sword. The patient was treated primarily without regard to ordinary cleanliness, and, becoming very ill, was admitted into hospital four days after receiving the injury. On admission the wound was gangrenous, with thickened, everted edges, and on pressure discharged quantities of sero-sanguinolent fluid with bubbles of putrid gas. From the wounded area, extending quite to the fold of the groin, was a distinct gaseous crepitation. The extremity was swollen throughout its extent, and was distinctly bronzed in the neighborhood of the wound.

As evidence of marked septic poisoning, the general condition of the patient at this time was extremely bad; the pulse small, frequent, and irregular; entire loss of appetite; infective diarrhœa; and notable albuminuria.

Under the direction of Nélaton, Reboul immediately made, throughout the affected limb, numerous long and deep incisions with the knife and thermo-cautery, besides making with the latter

instrument applications to all intervening spaces, extending quite as far as the gaseous invasion.

To the lesions thus made sublimate solution (1 to 1000) was freely applied, and, following this, naphthol camphor in solution and the ointment of salol. Internally, naphthol and salicylate of bismuth were given, with quantities of alcohelic stimulants and an occasional dose of quinine. The patient immediately improved, but two days later the tumefaction and gaseous crepitation extended over the abdomen and as far as the base of the thorax. Again numerous incisions were made and treated as before.

The leg was by this time quite gangrenous. The crepitation did not advance beyond the new incisions and the general condition became considerably improved. In this improved state an amputation at the middle of the thigh was practiced one week after admission and eleven days after the receipt of the injury. The stump was left open and treated with abundant irrigations of sublimate solution, and, in addition, as before, with naphthol camphor and salol ointment. The patient made finally a perfect recovery.

In the same line, Ballenghein,[220] in a paper read before the Anatomico-Clinical Society of Lille, reports some striking results from local antiseptic treatment in cases of gaseous gangrene. He speaks of the value of open-wound treatment and the repeated employment of antiseptic substances in solution; and then, if the disease persists and the advancing microbe is not yet destroyed, of the great importance of large incisions (debridements) and deep punctures in every suspected focus of trouble with the thermo-cautery. He considers that this treatment, combined with carbolic-acid irrigations and the free use of iodoform and other antiseptics, offers the best possible means of combating the disease. This treatment should always be practiced in the beginning, and if the gangrene continue to advance, resisting methods at once so simple and so powerful, amputation should always be done unless absolutely contra-indicated by the condition of the patient.

Reasoning from these and various other observations, it would seem that in spreading gangrenous conditions the classical early amputation of affected members at a distance above the area of infection is, even if practicable, not always proper or expedient. That amputation should be done and done early in many cases is evident, but there are cases where so considerable an operation

could only be followed by speedy dissolution. For this reason it may often happen that, before subjecting an already weakened and infected patient to such additional shock, it would be wiser to seek to obtain, by all the means in our power, an amelioration of the general condition. That this can be accomplished in certain cases is clearly established, but no half-hearted measures will suffice. First of all, active, persistent, and radical efforts should be made toward dislodging and destroying the invading organisms and their attendant chemical poisons. To this end the early employment of the knife or thermo-cautery, one or both, is essential. Throughout the affected area extending to the limits of gaseous invasion, free, deep, and numerous incisions should be made without delay. In this way not only is all tension relieved and a chance given for the disease products to escape, but, in addition, an opportunity is given through such incisions for that most important object,—the thorough and constant application of antiseptic agents.

Throughout all the incisions and about the original wound, copious and repeated irrigations should be used. If possible, every suspected focus of trouble should be reached. When amputation is performed, either primarily or as a last resort, the stump should be left freely opened and treated in the same vigorous way. The antiseptic substance employed is of less importance than the thoroughness of its application. Corrosive sublimate, carbolic acid, naphthol, and other agents have been used with nearly equal results. The danger of poisoning from these agents, even the most potent, is small, and when occurring is easily overcome. The use of hot water alone, either by irrigation or by continuous bath, has its advocates and has been followed by the best results. Such other agents as iodoform, aristol, etc., may be used in ointment or powder as supplementary to the rest. By internal treatment we should endeavor in every possible way to sustain and strengthen the rapidly failing and infected patient, using abundantly alcoholic stimulants, quinine, iron, salol, and such other agents as may suggest themselves. Besides this, of course, proper nourishment is of the utmost importance.

The co-existence of emphysematous gangrene with tetanus has been noted from time to time by various observers, and in this connection Verneuil [100 Nov. 8] has recently announced some conclusions of interest. He says that this coincidence in man is not a matter of

chance, but it is due to the simultaneous introduction through a wound of the two specific microbes of Pasteur and Nicolaier; and that since these organisms are found in the same situations, notably in superficial cultivated soil, such double infection is all the more probable. The two diseases, although of contemporaneous origin, are not influenced at all in their development by each other, and the radical removal of the gangrene does not diminish the possibility of the subsequent appearance of tetanus. Other infectious diseases, as charbon, erysipelas, typhoid fever, etc., have been seen to develop in connection with tetanus, without having their clinical histories at all changed. Septic infection, on the contrary, is rarely or never seen as an associated condition, perhaps because of a microbic antagonism.

SEPSIS.

One of the recent writers on the subject of traumatic infectious diseases, Henry S. Stark, [50 Feb.] in an article which argues that they are not maladies *sui generis*, but rather secondary phenomena of microbic poisoning, says that the terms septicæmia, pyæmia, and septopyæmia no longer retain their original signification, but are, in fact, obsolete; and, further, that the entire pathology and etiology of the infectious diseases ought to be rewritten from the stand-point of the germ theory of infection. His own theory is: "that there is a traumatic disease *per se*, whose distinguishing characteristics are fever, infection, and suppuration; and that whether we call this disease 'suppurative,' or 'traumatic,' or 'putrid,' or 'pyogenetic fever,' or what not, the point is to recognize it as a distinct pathological entity."

That our views concerning the various septic processes in the organism have constantly to be changed or modified as time goes on is obviously true; and as on such subjects our accurate knowledge is but small and our theories numerous, we have, of course, still much to learn and perhaps more to unlearn. Nevertheless, with each year we mark some real advance, and find some points becoming gradually firmly established.

The consideration of the importance of one or more of the various micro-organisms in the production of a given disease and the conditions of soil which encourage or hinder their development and reproduction, and, in addition, the warfare against these organisms which is carried on in the body by both the fixed cells

and the leucocytes, and the part played by the chemical products of the bacteria themselves, still present problems which offer the largest and most fertile field for investigation.

Of the two distinct forms of sepsis now generally recognized, one is that of septic intoxication caused by the introduction into the circulation of preformed ptomaines from some local focus of putrefaction. This intoxication may be brought about by the absorption of poisons produced by the various bacilli of putrefaction, which develop in dead tissue exposed to atmospheric air, and which often possess gas-forming properties.

Among the most prominent putrefactive germs are the several bacilli saprogenes of Rosenbach and the proteus vulgaris, mirabilis, and zenkeri of Hauser. From the character of this form of septic poisoning it would seem that, unless the quantity of poison primarily introduced be sufficient in itself to overwhelm the organism, by a fatal intoxication, we may hope for the best results by vigorously attacking the infective foci to prevent further infection, and by aiding with stimulants and other agents the organism in its work of overcoming the poison already absorbed.

Clinically this is shown to be true by the brilliant results which have followed such treatment in certain gangrenous affections, and in the removal of necrotic masses from the uterus in some cases of so-called puerperal septicæmia (sapræmia).

The other variety of sepsis, the real septic infection (progressive septicæmia), is not caused by the germs of putrefaction or their products, but rather by certain micro-organisms which, entering the circulation from without, retain in the blood the power of reproduction and multiplication. In these cases the infection may occur directly into the blood-vessels or indirectly through lymphatic channels and connective-tissue spaces. For the production of this condition, while various microbes have been held by different observers as capable of playing a part, the germs of suppuration are usually at fault. The formation of pus at the primary wound is, however, not essential for its production. Septic infection may originate from wounds which do not suppurate at all, although a reason for the production in one case of suppuration and in another septicæmia, both from the same germ, is not apparent. The actual poison in cases of septic infection is probably not always the same.

In some experimental cases the symptoms seemed to follow the

and the skin with horse-hair sutures, etc. This operation was performed December 7, 1877. On November 2, 1888, nearly one year after, examination revealed that the patient had been permanently and perfectly cured of his locked jaw. Allingham expresses himself well pleased with the result, and will not hesitate to resort to this method of treating ankylosis of face in similar cases.

Oberst, of Halle, [69] in a paper on the "Treatment of Defects of the Mucous Membrane of the Cheeks," lays special stress on the correction of cicatricial trismus resulting from the operative treatment of malignant disease involving the buccal region. He says: "When a severe cicatricial contraction follows the extirpation of a carcinoma of the mucous membrane of the cheek, the patients are much worse than before the operation, since before the removal of the tumor (which usually interferes very little with the ability to open the mouth) they can alleviate their sufferings with frequent antiseptics and soothing mouth-washes. Feeding, which before was unobstructed, is extremely troublesome, and the secretions from the ulcerating carcinoma (when recurrent) flow continuously in the mouth, and can only be removed with great difficulty, and, at the best, imperfectly. Inflammation of the mouth follows, and the proliferation of the neoplasm becomes more dense. A part of the secretions of the cancer is swallowed or aspirated during sleep, causing catarrh of the stomach, bronchitis, or pneumonia, by which the sufferings of the patient are considerably increased." Oberst is convinced that, in cases of carcinoma involving the mucous membrane of the cheek, the operator should either refrain from interference, if the probability of recurrence was great, or, at all events, should operate by some method which would effectually prevent that most disastrous complication,—cicatricial lock-jaw. In two cases in which Oberst recently operated, the cicatricial closure of the jaws was successfully avoided by covering the greater part of the defect immediately after the extirpation by a plastic of the mucous membrane. The cases were:—

1. An ulcerating tumor of inner (mucous) surface of left cheek, as large as a five-mark piece. Tumor extended from second molar to commissure of mouth, and above and below to gingivo-buccal angle. Skin over tumor intact; no infiltration. Mouth could be opened to normal extent.

Operation.—The growth was extirpated by external incision from the labial commissure to the middle of cheek, allowing a free excision of the growth beyond the diseased area. From this, a very large defect in mucous membrane of cheek had arisen, which, left to itself, would, without doubt, have caused considerable functional disturbance. To avoid this, a flap of mucous membrane was dissected from above and below, in front of the defect (see A and B in Fig. 8), and belonging each respectively to the upper and lower lips. Each flap measured 2½ centimetres in width, and was raised from the underlying submucous tissue sufficiently to allow it to meet the other flap over the

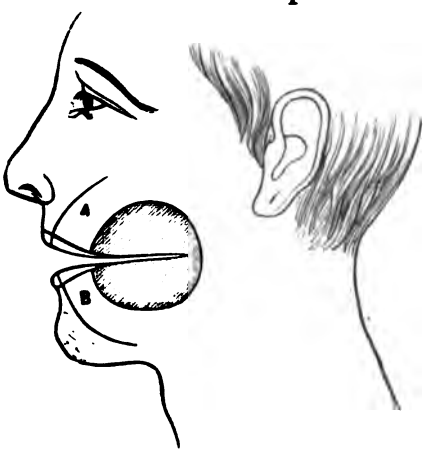


FIG. 7.—OBERST'S METHOD OF PREVENTING POST-OPERATIVE OCCLUSION OF JAW.

A, B, mucous flaps.

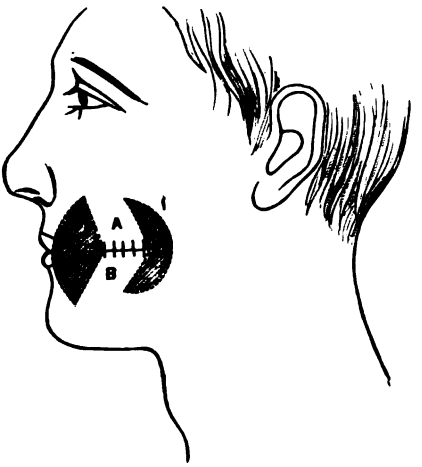


FIG. 8.—OBERST'S METHOD OF PREVENTING POST-OPERATIVE CICATRICIAL OCCLUSION OF JAW.

A, B, mucous flaps sutured and *in situ*; D, D', unprotected areas which are allowed to heal by granulation.

(*Deutsche Medicinische Wochenschrift.*)

middle of the defect. The two flaps were then united with catgut sutures and the external wound closed by other stitches. The circular defect caused by the extirpation of the tumor was early covered by a broad bridge of mucous membrane, which left only two narrow segments, in front and behind respectively, uncovered by mucosa, and which would finally heal by granulation. These unprotected areas, however, were not feared, as cicatricial contraction would not seriously affect the movements of the jaw, since the main gap was even.

2. This case was more extensive and required a greater sacrifice of the mucous membrane; still the gap was protected by an opera-

and the skin with horse-hair sutures, etc. This operation was performed December 7, 1877. On November 2, 1888, nearly one year after, examination revealed that the patient had been permanently and perfectly cured of his locked jaw. Allingham expresses himself well pleased with the result, and will not hesitate to resort to this method of treating ankylosis of face in similar cases.

Oberst, of Halle, [60] in a paper on the "Treatment of Defects of the Mucous Membrane of the Cheeks," lays special stress on the correction of cicatricial trismus resulting from the operative treatment of malignant disease involving the buccal region. He says: "When a severe cicatricial contraction follows the extirpation of a carcinoma of the mucous membrane of the cheek, the patients are much worse than before the operation, since before the removal of the tumor (which usually interferes very little with the ability to open the mouth) they can alleviate their sufferings with frequent antiseptics and soothing mouth-washes. Feeding, which before was unobstructed, is extremely troublesome, and the secretions from the ulcerating carcinoma (when recurrent) flow continuously in the mouth, and can only be removed with great difficulty, and, at the best, imperfectly. Inflammation of the mouth follows, and the proliferation of the neoplasm becomes more dense. A part of the secretions of the cancer is swallowed or aspirated during sleep, causing catarrh of the stomach, bronchitis, or pneumonia, by which the sufferings of the patient are considerably increased." Oberst is convinced that, in cases of carcinoma involving the mucous membrane of the cheek, the operator should either refrain from interference, if the probability of recurrence was great, or, at all events, should operate by some method which would effectually prevent that most disastrous complication,—cicatricial lock-jaw. In two cases in which Oberst recently operated, the cicatricial closure of the jaws was successfully avoided by covering the greater part of the defect immediately after the extirpation by a plastic of the mucous membrane. The cases were:—

1. An ulcerating tumor of inner (mucous) surface of left cheek, as large as a five-mark piece. Tumor extended from second molar to commissure of mouth, and above and below to gingivo-buccal angle. Skin over tumor intact; no infiltration. Mouth could be opened to normal extent.

Operation.—The growth was extirpated by external incision from the labial commissure to the middle of cheek, allowing a free excision of the growth beyond the diseased area. From this, a very large defect in mucous membrane of cheek had arisen, which, left to itself, would, without doubt, have caused considerable functional disturbance. To avoid this, a flap of mucous membrane was dissected from above and below, in front of the defect (see A and B in Fig. 8), and belonging each respectively to the upper and lower lips. Each flap measured 2½ centimetres in width, and was raised from the underlying submucous tissue sufficiently to allow it to meet the other flap over the

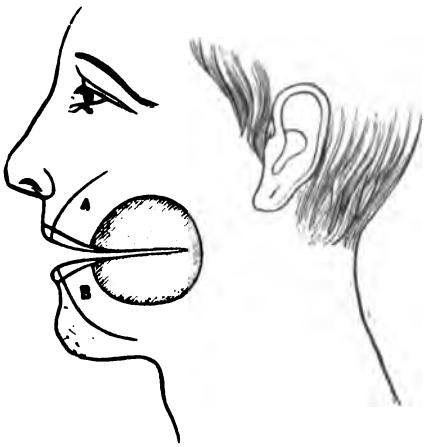


FIG. 7.—OBERST'S METHOD OF PREVENTING POST-OPERATIVE OCCLUSION OF JAW.

A, B, mucous flaps.

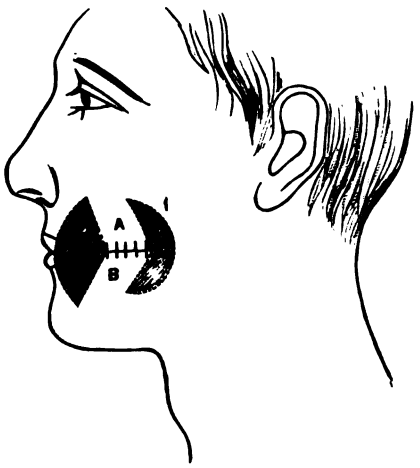


FIG. 8.—OBERST'S METHOD OF PREVENTING POST-OPERATIVE CICATRICIAL OCCLUSION OF JAW.

A, B, mucous flaps sutured and *in situ*; D, D', unprotected areas which are allowed to heal by granulation.

(*Deutsche Medicinische Wochenschrift.*)

middle of the defect. The two flaps were then united with catgut sutures and the external wound closed by other stitches. The circular defect caused by the extirpation of the tumor was early covered by a broad bridge of mucous membrane, which left only two narrow segments, in front and behind respectively, uncovered by mucosa, and which would finally heal by granulation. These unprotected areas, however, were not feared, as cicatricial contraction would not seriously affect the movements of the jaw, since the main gap was even.

2. This case was more extensive and required a greater sacrifice of the mucous membrane; still the gap was protected by an opera-

tion based on the plan adopted in the preceding case. Several days after the operation both patients were able to open their mouths to normal extent, and no bad tendency was noticed one month after the wounds were healed.

Oberst recommends his method for cases similar to those reported and for the treatment of not too extensive defects of mucous membrane which may result from other causes, such as tubercular and syphilitic ulcerations.

In very extensive tumors and cicatrices the method is not sufficient to prevent secondary cicatricial contraction, and one of the known methods of meloplasty—*μῆλον*, cheek; *πλάσσειν*, mold—(Gussenbauer's, J. Israel's, Hahn's, Kraske's) should be preferred. In all these methods flaps of skin which are turned with their epidermal surface toward the oral cavity are to be utilized to cover the defect.

The Obviation of Cicatricial Contraction of the Jaw by the Transplantation of a Skin-Flap.—Brohl, of Cologne, states that the unsuccessful treatment of cicatricial contraction of the jaw by division of the cicatrix and gradual dilatation of the contraction, as well as the poor results obtained by making an artificial articulation according to the plan of Esmarch and Rizzoli, have proven that the replacing of the cicatricial tissue by normal skin is the only operation capable of producing a permanent cure.

Thiersch's method of skin-grafting cannot be used in these cases, and only flaps nourished by pedicles can be utilized. Excellent results were obtained by Gussenbauer,[755 v.21-22] who replaced the mucous membrane by skin-flaps taken from the cheek, and covering the defect thus produced by other flaps taken from the neck or chin, doing, at the same time, a cheiloplasty of the already deviated mouth. This method is excellent, but has two faults: first, a difficult plastic at the angle of the mouth; second, the formation of extensive scars on the face.

Bardenheuer[69 No.5] succeeded in overcoming all these objections, as will be seen by the following case: A girl aged 21 years was treated in 1888 by injections of gray oil for syphilitic ulcerations of the vulva. In the beginning of 1889 she was attacked by a marked and rapidly spreading stomatitis ulcerosa, which, notwithstanding vigorous treatment, brought on extensive necrosis of the lower jaw and a marked cicatricial contraction of the mucous

membrane of the right cheek. On April 8, 1889, she was admitted to the hospital, and, owing to extensive cicatricial bands between the gums and cheek of the upper and lower jaw on the right side, she could hardly open the mouth over 2 millimetres. Four teeth had been removed for caries, but the others were sound and the stomatitis was perfectly cured.

On April 20th, Bardenheuer, by means of an incision 8 centimetres long, parallel to the border of the lower jaw, removed the cicatricial bands, so that the mouth could be opened completely by a speculum. At the same operation he marked out a double pedicled flap, one bridge of which was on the right clavicle, while the other was in the direction of the ramus of the jaw and about 2 centimetres from it. The wound along the border of the jaw was packed with gauze. On May 8th the flap was dissected away from the underlying tissue and its lower bridge gradually cut away. This was completed May 15th, when the flap was twisted in its upper pedicle and the granulation scraped off; the flap was passed through the wound along the border of the jaw, drawn into the mouth, and fixed in position by silk sutures which went entirely through the flap and cheek. The wound in the mouth had been freshened. The defect in the clavicular region was freshened and sewed. On June 4th the pedicle of the flap was cut through and sewn in the wound of the jaw, and the loss of substance on the neck was covered by skin-grafts according to Thiersch's method.

The wound along the angle of the jaw was completely healed July 26th. During the whole course of the treatment much stress was put on the frequent cleansing of the mouth and its frequent opening and dilatation by a Heister speculum. Seven months after the operation the patient could open her mouth perfectly and separate the teeth over 2 centimetres. The only scar on the face is along the border of the jaw, and is not adherent to the bone. The patient can now be regarded as completely cured.

At the Seventh Congress of Italian Surgeons, Bajardi, of Florence, $\frac{8}{\text{June 19}}$ reported a case of congenital closure of the jaw, which had its beginning, he believed, in a contraction of the masseters. Notwithstanding this, he resected the condyle first, then the muscle process; this procedure proving fruitless, he cut through the masseter. A cure, with restitution of functional activity of the lower jaw, was

the cuspid teeth. A small tube of German silver, ½ inch in length, was soldered to said band and in exact alignment; a piece of wire, accurately fitting the bore of this tube, bent at right angles at one end and having a screw cut upon the end, was slipped through each tube and secured thereon by adjusting a nut on the screw. The bands were cemented in position upon teeth by means of oxyphosphate cement, as shown in Fig. 2. After the cement had become thoroughly set the rent was tightened until the ends of the bone were drawn snugly together. These bands, tubes, wires, screws, and nuts are some of the appliances known as the "Angle Regulating and Retaining Appliances," devised and used for correcting irregularities of the teeth (Fig. 3).

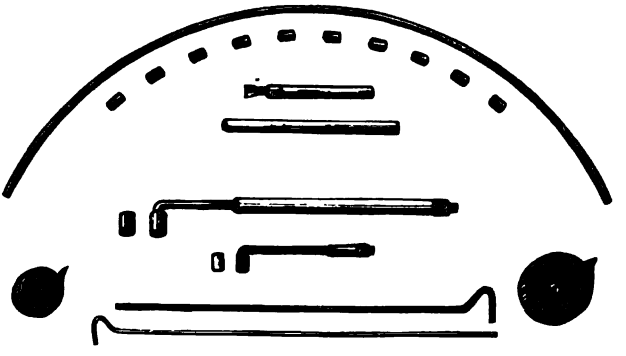


FIG. 3.—ANGLE'S REGULATING AND RETAINING APPARATUS. (*Medical Record.*)

In the case reported the appliance was worn without inconvenience or displacement for twenty-one days, when it was removed, the bone having been firmly united. On the third day after the application of the apparatus the patient was able to eat freely and use his jaw. This device may be applied in any locality on either jaw, provided suitable teeth for anchorage be not too remote from the seat of fracture. The screw may be bent to accommodate the curve of the jaw, should fracture occur in the region of the cuspid.

II. The method applied to cases of the second class may be understood from the treatment in the following instances: A male aged 45 received a blow from a police club, producing two simple fractures of the inferior maxilla. The first was an oblique fracture of the right side, beginning with the socket of the second bicuspid,

extending downward and backward, involving the socket of the first molar, breaking out the second bicuspid, and greatly loosening the first molar. The second molar had been lost a year before, while the third, as well as the remaining teeth, were much abraded and loosened by salivary calculi, thus making the application of the appliance described in Case I impossible. The second fracture was situated in the opposite side, high up the ramus. The patient was unable to close the jaws. The fracture on the right side was widely separated, and the anterior piece was much deformed by reason of the contraction of the digastric muscle, while the posterior piece of bone was drawn firmly up, the molar tooth occluding. Bands were made to encircle all four of the cuspid teeth, they being the most firmly attached to their sockets; the fractured ends of the bones were placed in careful apposition, the lower jaw was closed carefully, occluding the lower teeth upon the

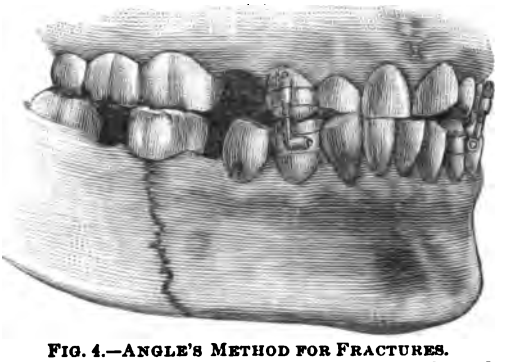


FIG. 4.—ANGLE'S METHOD FOR FRACTURES. (*Medical Record.*)

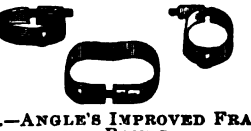


FIG. 5.—ANGLE'S IMPROVED FRACTURE-BANDS.

upper, and requiring so great force and occasioning so much pain that an anæsthetic was required. Points on bands required for the necessary attachment were carefully noted. The bands were then slipped off the teeth and little pipes (*vide* Fig. 4) were soldered at the marked points, after which the bands were cemented in their proper positions upon the teeth, and two small, traction screw wires were drawn firmly together, and each tooth occupied its exact normal position in occlusion with its fellow on the opposite jaw. Tooth fractures were then carefully examined, and found to be in perfect apposition.

As illustrations of the mechanical treatment of the second class, the author adds another very interesting case, in which a bilateral fracture had been sustained thirty-two days prior to treatment by Angle's method. In this instance, after reducing the

fracture and bringing the teeth in apposition, the improved fracture-bands shown in Fig. 5 were used with excellent results.

In using these bands no cement is necessary, and, instead of of the screws, small metallic buttons are soldered to the side of the bands (as shown in cut), around which is wrapped in the form of a figure 8 fine binding-wire, as shown in Fig. 6. Angle believes that the patients are able to obtain sufficient nourishment until the repair of the fracture is complete, and claims as the special advantages of his procedure: (1) cleanliness; (2) comfort to patient, as compared with many other bulky and awkward appliances; (3) its extreme simplicity, enabling any one with ordinary mechanical ability, when provided with a set of clamp-bands, to easily and

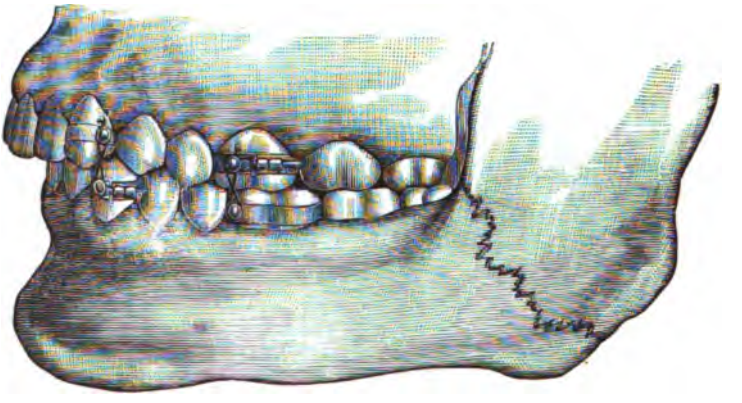


FIG. 6.—ANGLE'S IMPROVED FRACTURE-BANDS APPLIED.
(*Medical Record.*)

quickly set all ordinary cases of fracture; and (4) the certainty of correct results.

III. Cases comprising fractures of edentulous jaws are, fortunately, very rare. The method of treatment proposed by the author in such cases is similar in principle to that already applied in the first class, except that in place of teeth small bone hooks are used; a suitable cavity for their reception being drilled on each side of the fracture coincident in position with the original sockets of the teeth, as if implanting teeth were intended, save that the cavities then made need not be nearly so large or so deep. They should also be drilled obliquely to correspond to the course taken by the hooks.

Cuthbertson[39] reports a case of fracture of the zygoma in a

young man, resulting from a blow struck with the fist. There was a depression over the zygomatic arch. Other practitioners, who examined the case, doubted the existence of fracture, believing the condition to be due to a congenital depression of the bone. There was no pain, swelling, or bruising, notwithstanding the fact that the patient had been injured on the day of examination.

A very interesting case of multiple compound fracture of the lower jaw, caused by the bite of a hunted grizzly bear, is reported by W. F. Edgar, of Los Angeles, Cal.[59] After trying several devices, the expedient of drilling the bones and wiring the fragment finally succeeded in securing permanent and good union.

C. A. McGuire[801] reports a severe case of fracture of the inferior maxilla, involving right antrum, which was successfully relieved by orthopraxis.

DISLOCATIONS.

Henry Lee[6] reports the case of a boy 4 years old who fell some 30 feet out of a window. There was no fracture after the fall, but the submaxillary glands became very much enlarged, and for many months there was a constant dribbling of saliva. Frequent attacks of earache and deafness supervened. Seven years after, Lee examined the patient and discovered that dribbling of saliva continued to some extent and the left submaxillary gland continued enlarged. The mouth could be opened only to one-half of the natural extent and the power of rotating the lower jaw had been lost. A distinct depression could be felt at the place naturally occupied by the interarticular cartilage of the left side. There was difficulty in pronouncing some words distinctly. The jaws came evenly together when the mouth was shut. The ptyalism and enlargement of the submaxillary gland are accounted for by the irritation of the chorda tympani caused by the displaced cartilage.

This is probably the only recorded instance of this dislocation. Should a similar case present itself, the cartilage might probably be made to resume its natural position by an operation similar to that for ordinary dislocation of the jaw. It might be supposed that if interarticular cartilage on one side only were displaced, that side of the jaw would be a little higher; but it must be remembered that the centre of this cartilage is very thin and often perforated, so that its removal would make very little, if any, difference in the position of the condyle.

An instructive case of *bilateral* dislocation of lower jaw in an adult aged 30 is reported by Brockway. 764 May About thirteen months before admission, during an attack of vomiting, patient dislocated both condyles of lower jaw. On admission lips could be approximated and saliva retained; mastication, deglutition, and speech were very imperfect, and she took fluid diet solely. Lines of teeth about ¾ inch apart and that of the lower jaw projected ½ inch beyond that of upper. Chin depressed and prominent, lower jaw nearly immovable. Patient's condition and appearance were not distressing, and she desired relief mainly to be able to take solid food. Under ether unsuccessful attempts at resection were made. Efforts by manipulation produced only slight motion toward replacement of left condyle. A horizontal incision below left zygoma was made, which exposed the stretched, untorn capsule of joint surrounding head of condyloid process. The glenoid fossa was filled with fibrous tissue, which was allowed to remain. By means of a blunt instrument placed in the sigmoid notch, this condyle was forced back over articular eminence and made a depression for itself in the newly-formed tissues of old joint-cavity, but did not tend to stay in place. Manipulation now failed to restore the right condyle, and a similar cutting operation was done over this articulation. Then, with an instrument in either sigmoid notch, the jaw was reduced, the teeth could be approximated, though still protruding about ¼ inch, due to the filling up of the glenoid fossæ. Wounds were sutured, with drainage and dressings, and jaw held in place with plaster of Paris. Patient was fed through a tube introduced at site of an extracted tooth. On seventh day was allowed limited use of jaw for eating and talking, and on tenth day was discharged cured. One case of reduction by manipulation, after four months, is reported.

Another interesting case of double luxation of traumatic origin (fall) is reported by A. Bossion, Algiers, Africa. 127 Nov. 12 The patient, a male aged 31 years, fell a distance of 2 metres and dislocated his lower jaw bilaterally. The dislocation was reduced under chloroform, but it recurred twenty-two times in the course of a year, at times from the most trivial causes. He was finally radically relieved by the application of an immobilizing apparatus after the reduction of the last luxation, by restriction to a milk diet for some time, and by faradization of the temporal and masseteric regions.

OCCLUSION OF JAWS.

A case of twenty-seven years' duration in a woman aged 34 years was successfully operated upon by J. Ewing Mears.[9 Nov. 28] The patient was badly salivated when 6 or 7 years of age, causing considerable destruction of tissue and extensive adhesions. Notwithstanding that the space between the teeth would just admit the point of a thin knife-blade, she had been doing duty as a teacher, talking through the teeth. She also presented a condition which has been noted in cases of the same nature,—non-development of the lines of the bones and soft tissues of the face. She was about 5 feet 8½ inches tall, and yet she had the face of a child,—what Mears has designated as a "baby-face." Since the operation this appearance changed, and she now has the face of a woman.

Previous to operation the buccal space was entirely obliterated. There was simply an opening between lips, through which could be seen only the incisors and canine teeth of the upper and lower jaw. The case was one of cicatricial occlusion. She was etherized and an incision made through cicatricial tissue on each side, and the mouth forced open. At the same time Mears removed nineteen teeth. Those of the lower jaw crossed under the tongue, those of the upper jaw projected in various directions, so that in the oral cavity proper there was scarcely room for the tongue. These teeth erupted after the jaws became occluded, and, not being able to develop in a proper manner, had taken the position described. The cavities made by the incision were packed with 5-per-cent. iodoform gauze. The second stage of the treatment consisted in the passage of ligature through the cicatricial mass. These ligatures, being deposited as deeply as possible on either side by means of a long needle with an eye near point, were brought out on a line with the position of the last molar tooth; they consisted of heavy silk, twisted and carbolized, and tied loosely. In conjunction with this, Mears used an apparatus which he devised some years ago for opening the mouth, etc. Some contraction followed the division of the cicatricial mass. The object in passing the ligature was to get a canal or track which, after a time, would be lined by mucous membrane, and could permit division of the overlying tissues without reformation and reunion, as we treat webbed fingers or toes. In three weeks' time the tissues over the ligatures were divided and the ligatures were re-applied, using two on each side, one above

the other. These were allowed to remain in place for three weeks, when the overlying tissues were again divided, and it was found that an opening of $1\frac{3}{4}$ inches had been secured. The use of the instrument was continued for some time after the patient's return to her home. One year after, she opened her mouth $1\frac{1}{2}$ inches between artificial teeth. Mears says the result in this case was similar to those he has secured in other cases in which he had adopted the plan of treatment by ligatures. He has from time to time tried simple division of the tissues, but invariably the jaws have again closed. All the incisions were made and the ligatures deposited within the mouth. He reported other cases of this kind, one in which he opened the mouth of a gentleman in whom the closure was of seventeen years' standing, and, although 32 years of age, he had never grown any beard. As soon as the man regained the use of the jaw the beard began to grow and the face was soon covered with hair. This can probably be explained by the increased circulation brought about by the use of the muscle.

In discussing the paper, Allis and Mears laid stress on the miserable condition of persons afflicted with this trismic condition. One patient, a boy, crowded a large quantity of pie between his teeth by the aid of a knife and a stick, so that he was in great danger of asphyxia. It is impossible to treat throat trouble; vomited matters must escape through the nose; feeding is possible only with fluids. As Allis said, there is no operation that is a greater boon to such patients than that described by Mears.

At the meeting of the Surgical Section of the Suffolk District Medical Society, A. T. Cabot[131] read a paper on bony ankylosis of the temporo-maxillary joint relieved by osteotomy of the neck of the inferior maxilla. He reported 3 cases in which the operation had been done with permanently good results. In the first case, only the neck and head of the condyle were removed, but in the two others, owing to extensive new formation of bone, it was necessary to cut away the coronoid process as well. In all 3 cases the functional result was excellent.

The writer gave his preference to the external incision of Bottini rather than to the internal operation of Mears, on account of the greater exactness with which the operator could, by the outside incision, remove just as much of the bone as was necessary, and because he felt that in the last 2 cases reported by him the forcible

twisting off of the upper end of the ramus would have been very difficult, and its thorough removal well-nigh impossible.

He called attention to two signs by which, in a jaw ankylosed on one side, it could be determined which condyle was fixed: first, the slight springing that such jaws are capable of by forced efforts at mastication is a little more noticeable on the side on which the condyle is free; and, secondly, owing to the loss of bone which accompanies the ankylosis, the lower jaw is displaced toward the affected side, which displacement can be perceived by comparing the intervals between the upper and lower incision.

Allingham [2] reports an interesting case of ankylosis of the temporo-maxillary joint, successfully treated by excision of condyle and neck of jaw. A boy aged 8 fell from a wall 10 feet, upon the point of the chin. Pain in and a progressive stiffness of the right temporo-maxillary joint followed. Various attempts were made to force the jaw open, but they only improved the condition temporarily. Finally, the following operation was performed under chloroform anæsthesia: An incision was made over and along the zygoma for about 2 inches, and downward along the posterior margin of the jaw for some distance. The skin was dissected downward off the parotid fascia, and the fascia and the masseter were then divided from the lower border of the zygoma and pushed down so that the facial nerve and parotid gland were left untouched. The external carotid was accidentally divided, and had to be tied. When the masseter had been separated to the same extent as the skin incision, Allingham introduced a small saw (Adams's) and tried to saw through the neck of the jaw, from above downward, so as to weaken the bone; he could not completely saw this through, and with difficulty succeeded in passing one limb of a curved-cutting bone forceps over the sigmoid notch, and with great force cut the bone obliquely through the partially sawn, and therefore weakened, portion. He endeavored to disarticulate it, but the condyle was too firmly ankylosed. Then, after freely dividing the capsule, he put an elevator into the joint and forced the condyle from the temporal bone. After a few cuts the soft parts divided and the condyle and neck of the jaw were removed. There was no bleeding, and a drainage-tube was introduced. The masseter and parotid fascia were sewn with buried catgut suture to the zygoma,

and the skin with horse-hair sutures, etc. This operation was performed December 7, 1877. On November 2, 1888, nearly one year after, examination revealed that the patient had been permanently and perfectly cured of his locked jaw. Allingham expresses himself well pleased with the result, and will not hesitate to resort to this method of treating ankylosis of face in similar cases.

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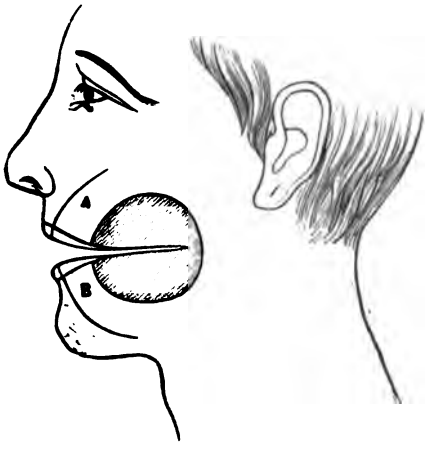
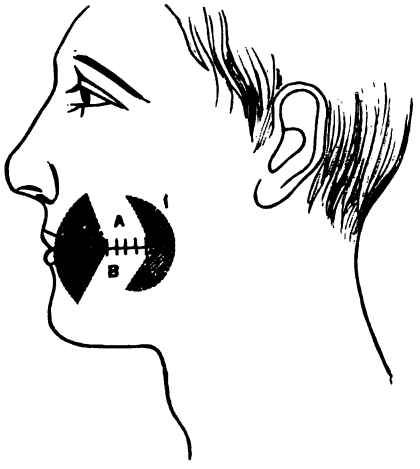


FIG. 7.—OBERST'S METHOD OF PREVENTING POST-OPERATIVE OCCLUSION OF JAW.

A, B, mucous flaps.



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A, B, mucous flaps sutured and *in situ*; D, D', unprotected areas which are allowed to heal by granulation.

(*Deutsche Medicinische Wochenschrift.*)

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2. This case was more extensive and required a greater sacrifice of the mucous membrane; still the gap was protected by an opera-

important is the fact that the masses of epithelium are solid in the beginning, and have, besides, a cylinder epithelium; they resemble, therefore, the enamel organs of tooth development. In the normal lower jaw we always find remains of epithelium around the roots of the teeth. These paradental remains play an important histologic-anatomical part in the development of epithelial tumors of the lower jaw.

OPERATIONS ON JAWS.

Joseph D. Bryant, of New York, [1002 Feb.] contributes a notable and most instructive analysis of 254 cases of excision of the superior maxilla, collected from various sources. Of this number 2 only are the author's personal cases. In 230 of the 254 cases one jaw only was removed, leaving 24 in which both were excised simultaneously. The nature of the disease for which the operations were performed was largely of a malignant character. One hundred and eighty-eight of the 230 cases of removal of a single jaw recovered more or less promptly. Thirty-three, or about 14 per cent. of this entire number, died sooner or later from either the immediate results of the operation or from its complications and early *sequelæ*. Complete removals of a single jaw are found to have been followed by a death-rate five times greater than after incomplete removals. Primary hæmorrhage caused death in 9 cases, or about 4 per cent. of the entire number. Erysipelas, septicæmia, and other complications claimed their share of deaths. In 57 (66—9), or about 25 per cent., of the 230 cases, profuse hæmorrhage is reported to have taken place, coming about equally from the facial incisions and from the deeper parts of the wounds. The sources of this hæmorrhage were from recognized branches of the facial and internal maxillary arteries, as can be easily comprehended. In 13 instances, or about 5½ per cent. of the entire number, dangerous hæmorrhage is reported of a primary and secondary nature. It may not be uninteresting to note the fact that the left jaw was involved 110 times, and the right 74 times in the 230 cases. Of the remaining 46 the histories do not indicate the side involved. However, sufficient facts have been recited to suggest the interesting and probable circumstance that the left jaw appears to be more liable to disease than the right. More deaths are reported to have followed removal of the right than left maxilla. This is probably coincidental only.

In the 24 cases in which both upper jaws were removed simultaneously not a death is reported to have occurred as the direct result of the operation. This is a strange fact when it is recalled that 14 per cent. died from the immediate and consequent effect of the removal of a single jaw, but it is probably only a coincidence. Profuse hæmorrhage was present in only 6 of the 24 cases, and dangerous hæmorrhage happened but once.

Bryant submits the following conclusions: (1) that excision of the superior maxilla is not a dangerous operation; (2) that, contrary to general belief, excision of both superior maxillæ is not a specially dangerous procedure; (3) that, while dangerous hæmorrhage is not frequent in this operation, still its effects are to be feared more than any other result of the operation itself; (4) the removal of the upper jaw for the cure of bony and fibrous tumors and for the removal of naso-pharyngeal polypi is attended frequently with dangerous and fatal hæmorrhage; (5) the ligature of one or both *external* carotids is a commendable procedure, when dangerous hæmorrhage is apprehended as the result of operation on the area of their distribution; (6) that ligature of one or both of these arteries may delay or hinder the progress of a morbid growth, if it be developing in tumors supplied with blood by these vessels; (7) that, other things being equal, ligature of the common carotid for the purpose of controlling the circulation of the external is unwise, unsurgical, and unwarrantable; (8) that complete removals are five times as fatal as incomplete removals of single inferior maxillæ, irrespective of the nature of the disease and of the side removed.

Angel Pulido, of Madrid, corresponding editor, sends an abstract of a paper by E. Cervera, 907 June in which he describes a *prothetic wire arch*, to be made in cases of partial resection of the lower jaw, in order to obviate the deformity, deviations, and annoyances which result after the resection of the jaw; it also prevents the falling back of the tongue, which is a serious source of peril in this operation, owing to the detachment of the muscles attached to the genial tubercles. The arch is very easily constructed and is of simple design, as shown in the figures on next page. The arch is made of nickel-plated steel wire, which is modeled to the configuration of the jaw. The arch is screw-tipped, so that it can be easily introduced to the depth of 2 centimetres or less into the

sawn surface of the bone. The arch was applied by Cervera in the case of a female patient with a central osteosarcoma of the body of the jaw. After the extirpation of the growth and body of the bone, two small perforations were made with Colin's drill to the depth of 1.5 centimetres into each of the sawn surfaces of the horizontal rami, in a direction perpendicular to the cut surface, and at a point 1 centimetre from the lower border of the maxilla. There was no difficulty in adjusting into these perforations the screw-tips of the arch.

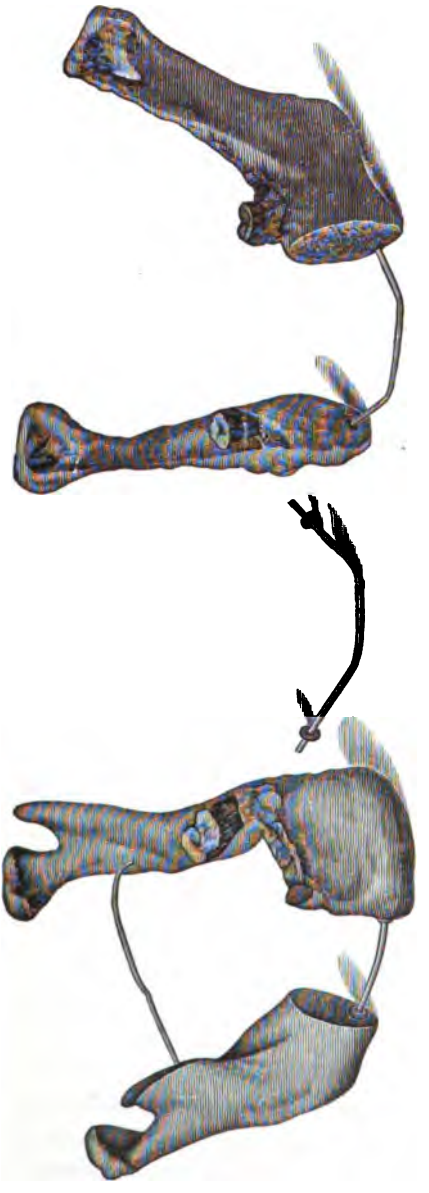


FIG. 12.—CERVERA'S PROTHETIC WIRE ARCH FOR PARTIAL RESECTION OF LOWER JAW. (*Revista Clinica de los Hospitales.*)

After the arch had been thus adjusted, he sutured, or rather reinserted, the tendinous portion of the genioglossi and the geniohyoidei to the central portion of the arch, using for this purpose four interrupted sutures. By this procedure the operator was able to dispense with the usual transfixion of the tongue with a thread, to keep it from falling back,—an attachment which usually has to be maintained for four or five days before it can be dispensed with. In Cervera's case healing was complete on the eighth day.

Notwithstanding the excellent result obtained in this first trial, the operator proposes to substitute an ivory arch for the present metallic material, this ivory being further covered by a layer of decalcified bone prepared from the tibia of the ox, hoping thereby to replace the original osseous loss by the substitution of a more suitable material.

Very similar is the apparatus independently, but *subsequently*, suggested by Guermonprez, of Lille, [3 Aug.30] who reports that in a case of epithelioma of the lower lip, involving the jaw, he endeavored to replace the excised bone by substituting a heavy silver wire passed through perforations drilled in the bone. Two perforations were made on each side, and two wires passed through and held in place by bending them over the external surface of the bone. The genio-hyoglossus and genio-hyoids were re-inserted by means of horse-hair sutures to the lower wire and thoroughly anchored. As can be readily understood, the wire was easily adapted to the shape of the symphysis. The immediate results were satisfactory; union of the external parts took place *per primam.* On the tenth day after the operation the prothetic wire jaw was removed. The tongue did not fall back, however, and there was no sign of suffocation. Still, since the lower lip was not sufficiently supported, and there was extensive dribbling of saliva, Guérin [3 Sept.11] stated to the French Academy that the apparatus was not a prothetic success. The idea is not a new one, since Verneuil, years ago, and long before him, Rigal (de Gaillac), proposed to replace this excised body of the jaw by an intermediary body. Martin's suggestions and experiments, referred to in the ANNUAL for 1890, are by far the most practical and ingenious application of prothetics to the surgery of the lower jaw, and are far superior to any of the methods here presented.

Orthopædic Resection of the Inferior Maxilla.—In a girl of 16, who since her birth had suffered with a deformity of the lower maxilla, Richelot [908 v.13,p.454] resected a piece 2 centimetres long, united the fragments with silver wire, but, in spite of healing by first intention, no bony union took place. Later on, Rouher succeeded in obtaining union by taking pins made fresh from the tibia of a calf and driving them into fragments which had been previously perforated for this purpose. The result, in regard to its functional and æsthetic aspect, was very satisfactory.

An interesting case of excision of the upper jaw for naso-pharyngeal polypi is described by George Thon.[6 July 12] Preliminary tracheotomy was performed, as dyspnœa was urgent (the subject being a male aged 35). The left upper jaw was removed, as the growth appeared at opening from the left side of base of skull. Chloroform was administered through the tracheotomy tube, and a sponge plugged the pharynx. Fergusson's incision was made. The tumor grew from the left pterygoid plate, and was completely removed, with bony attachments. It was of the size of a small Tangerine orange. Tracheotomy tube was removed four days after operation. On the ninth day the patient was discharged from hospital cured.

A case of excision of the superior maxilla with simultaneous ligation of the external carotid was reported by William Perrin Nicholson, Atlanta,[117 Aug.] in a female suffering with a tumor of one year's duration, growing rapidly during pregnancy. Shortly after confinement the carotid was ligated half an inch above bifurcation. The maxilla was removed without ligature of a single vessel.

William D. Hamilton, Columbus, Ohio,[61 Nov. 29] reports 5 successful cases of removal of the upper and lower jaws, which are classified as follows: 1. Adenosarcoma of lower jaw. Removal of left half of bone. Recovery. Operation September 30, 1888. Female, aged 27. 2. Osteosarcoma of right upper jaw. Discission. Recovery. Operation February 11, 1888. Male, aged 16. 3. Large, round-celled sarcoma of right upper jaw. Discission. Recovery. Operation March 2, 1889. Male, aged 55. 4. Sarcoma of left upper jaw. Discission. Recovery. Operation November 6, 1889. Female, aged 12. 5. Recurrent (myeloid or giant-celled) sarcoma of lower jaw. Discission, right half. Recovery. Operation November 30, 1889. Female, aged 36.

These cases, and 1 already reported,[1 May 10, '87] in which a large tumor and half of the lower jaw were excised, make 6 in all,—3 of the superior and 3 of the inferior maxilla. The author believes that a large proportion of these cases can be successfully handled without preliminary tracheotomy, and that the best way to *do* them is to get through with them as quickly as is compatible with thoroughness. All the patients are free from recurrences to date of report.

SALIVARY GLANDS.

Inflammation.—G. E. Wladimirow [21 No. 46] says that cases of primary inflammation of the salivary glands are rather rare, but such cases have been described by Löschner, Sottmann, Penzoldt, and Henoch. The author has observed in the St. Vladimir Hospital, Moscow, 3 cases of this affection, and briefly reports them. A moderate fever was noticed in all, the enlarged submaxillary gland was somewhat sensitive to pressure, and a diffuse swelling of the connective tissue was also noticed. These symptoms disappeared in three to five days. The third case is interesting because a brother of the patient, 6 years old, had become sick at the same time with double-sided parotitis. Thus, in the same house, the same cause produced in one case parotitis; in the other, an inflammation of the submaxillaries. The differential diagnosis of parotitis, the lymphadenitis of Tillaux, and sudden swelling of the submaxillaries consequent upon retention of saliva, is not difficult. The infection happens in cases of parotitis by means of Stenson's duct, in cases of the submaxillary by Wharton's duct, which is, however, less easily infected on account of its hidden situation and of the narrow opening, copiously wetted by saliva, and which is, besides, almost closed by the tongue during rest. The rare involvement of the submaxillary glands in stomatitis aphthosa and ulcerosa is thus explained.

Salivary Calculus.—An anomalous case of salivary calculus is reported by E. Owen, [6 July 13] which is interesting on account of the obscurity in the diagnosis. A swelling of the cheek existed which appeared to be removed by the excision of a neoplasm in the region of the duct through an intra-buccal incision. Some time after a mobile calculus was detected traveling in Stenson's duct, but it could not be readily exposed because it hid in an enlarged diverticulum. Finally, by an external incision which opened the duct, the calculus was extracted and the case cured. Rohrer [57 No. 3] records a calculus extracted from Wharton's duct which was as large as a nut. It simulated ranula. Malony [2 Oct. 26, '90] reports a case in which obstruction of Wharton's duct was caused by a fine salivary calculus which worked its way out and formed a cast of the duct. Hutchinson, Jr., [6 Mar. 22] showed, at the Hunterian Society, a small salivary calculus from a woman aged 35, who was sent into the hospital as a case of epithelioma of the side of the tongue. There was a hard mass,

and, as it was in the situation of Wharton's duct, he thought it might be due to a calculus, and on cutting into it he found it to be one. A hard fibrous structure of about ½ inch in thickness surrounded the calculus and the glands in the neck were enlarged.

Beatson[213 May] reports a case in which a specimen, elongated and oval in shape, measuring ¾ inch in length and $\frac{3}{16}$ inch in breadth and weighing 6 grains (0.4 gramme), was removed from the floor of the mouth, under the tongue, in a female aged 34. Its presence had been noticed for about eighteen months, and had given rise to the fear of cancer. Cuitellet presented to the *Société des Sciences Méd. de Lyons*[211 May 22] two enormous salivary calculi extracted by Poncet from a patient. The smallest weighed 1.50 grammes (23 grains), the other 3.40 grammes (52 grains). At the Medical Society of Hamburg, L. Benjamin[69 May 8] exhibited a salivary calculus removed from a patient suffering for fourteen days with a very painful tumor on the *frænulum linguæ*, which interfered with speaking and swallowing. After evacuating a large quantity of pus an incision revealed the presence of a calculus.

Foreign Bodies in Ducts.—Two curious and rare cases of impaction of Wharton's duct, produced by the penetration of a fish-bone into this canal, are reported,—one by Sandoz[197 Oct. 20] and the other by Hayward, of Liverpool.[2 Oct. 12, '80]

In Sandoz's case a young man, while taking soup, suddenly felt severe pain beneath his tongue on the left side. A small swelling instantly formed and the submaxillary gland enlarged. The pain subsided. Four months and a half later the painful symptoms recurred. Palpation revealed the presence of a hard body located in the situation of Wharton's duct; subsequently this hard substance was extracted, and found to be a fish-bone 3½ centimetres in length, and completely covered with salivary concretion. Recovery rapidly ensued. Hayward's case closely resembled the above and was relieved in the same way.

Salivary Fistula.—Delatour[159 June] reports a case of persistent salivary fistula following an injury to the parotid gland. The fistula was finally cured by curetting, caustics, and pressure.

Ranula.—Wölfler[113 Apr. 6] exhibited a child 9 months old with a *ranula glandulæ Nuhnï*. The tumor is about as large as a nut, situated sublingually, has increased very little, can be felt easily, is sharply defined, fluctuates, and is transparent. The whitish,

protoplasm-like contents contain plate epithelium. Dermoid cysts or a lymphangioma cysticum are eliminated by these symptoms.

An interesting and rare case of congenital ranula is reported by E. Flinn.[16 Oct.] The patient, male, aged 29, when admitted to the hospital presented a peculiar appearance. The mouth was wide open and he could articulate with difficulty. The tumor nearly filled the entire cavity of the mouth. It was pushed upward and far backward, and could hardly be felt with the tip of the finger; the growth also projected beneath the jaw into the myelo-hyoid space and assumed an elongated form. In this situation, being about 5 to 6 inches in length, it was hidden from view by the patient's beard and was as large as a good-sized orange; the projection into the cavity of the mouth began to cause inconvenience about eight months prior to admission, and since that time the patient experienced progressively increasing difficulty in feeding. There was a constant dribble of saliva and he was unable to lie down for fear of suffocation. The tumor, which presented distinct fluctuation, was aspirated several times; the first aspiration drew 15 ounces (443 cubic centimetres) of a creamy-like fluid. As it refilled rapidly, it was thoroughly emptied by submaxillary incision and drainage. In this case, a tumor under the tongue had been noticed by the parents when the patient was only one or two days old. It remained for many years small as a pea and only lately swelled to present dimensions. This type of dermoidal ranula is rare.

N. Muller read before the Moscow Medical Society a paper on ranula in newborn children, in which he states that in the foundling hospital at Moscow 4 or 5 cases of congenital ranula had been observed during a period of seven years in 80,000 children. Up to 1877 there were only two known instances of this affection on record[25 Dec.,'77]: one published by Dubois in 1833, and a second more recent case by Lombard. Bryant records 2 cases, probably congenital. Sir W. Ferguson recorded 1 case. Fairlie Clark[16 Nov.] observes that these tumors, while they are called ranula, are in reality usually dermoids. In the discussion that followed the reading of this paper before the Royal Academy of Ireland, W. Thornely Stokes exhibited the photograph of a girl aged 4 who had a similar tumor under the tongue. Drainage in the mouth proved ineffectual and a submaxillary incision was successfully resorted to.

A rare case of double acute ranula is reported by Carré. [6 Mar.] The author was called to attend a man who felt something suddenly form in his mouth which was nearly suffocating him. When he arrived he found the mouth occupied by two large oval swellings of a pale, pinkish color, with translucent walls; the tongue was displaced backward over the glottis, occasioning severe dyspnœa and complete inability to swallow. On the right side the swelling also presented below the angle of the jaw. The patient had just begun dinner, having previously been in excellent health, when his mouth suddenly filled up with the tumor below the tongue, and, rapidly increasing, pushed the tongue backward so that only the under surface of the tip was visible on examination. There was nothing in the diet to account for the symptoms, and no calculi or stenoses of Wharton's duct could be discovered. A free incision was made, which gave exit to 1½ ounces of a fluid (74 cubic centimetres) which resembled saliva. Relief promptly followed.

Malignant Disease of Salivary Glands.—Formad [112 Dec.] reports a case of epithelioma of the salivary glands, with extension into the thoracic cavity by continuity of structure. At the autopsy the growth proved to have originated in the sublingual gland, extending to the submaxillary and parotid glands. It involved all the structures at the base of the tongue, extending around the larynx and pharynx to the soft palate, upward to the base of the skull, and penetrated the sphenoidal cells. It followed the œsophagus downward, infiltrating its serous coat, the post-mediastinal space, and extended all over the upper surface of the diaphragm. The growth presented a continuous chain of flat, nodular masses from the pharynx to the diaphragm, as stated. Another extension existed throughout the serous surfaces of the pleural cavity, without affecting the deeper structures beneath. Formad has studied 2 other cases of epithelioma of the salivary glands and one of the nasal glands, which, histologically, were identical with the neoplasm just described, but which did not show any tendency to generalization. They appeared like the common mixed tumors of the parotid, as more or less circumscribed nodular masses, with but limited peripheral infiltration. The extension of the neoplasm is more by continuity and contiguity of structure than by metastasis.

Formad has found pearly bodies to be a characteristic feature

of these new growths. True to their epiblastic progeny, the epithelial elements of the salivary glands appear to limit themselves to local tissue invasion, differing, histologically, from the cancers of the hypoblastic organs in forming pearly bodies throughout the growth, as do the epitheliomata of the epidermis. The only difference is that, while the pearly bodies of the latter may be very large, those of cancers of the epiblastic racemose glands (like the salivary) are very small.

Briquet, Lille, [220] carefully describes that rare condition—primitive sarcoma of the submaxillary gland. The whole number of recorded cases only sum up to 14, according to the careful thesis of Jouliard. [1118] According to Jouliard, there are no signs distinctive of cancer of the submaxillary glands; in some cases the progress of the disease is that of a benign growth, in others it is that of a malignant tumor of the typical sort; generalization or metastasis is rare. The diagnosis is most delicate; it is normally impossible to localize the trouble in the gland or to recognize its malignant nature in the beginning. From the anatomo-pathological stand-point, the recorded cases of malignant tumors of this gland may be distributed as follows: five carcinomata, three epitheliomata, six sarcomata. The evolution is usually slow in all. The diagnosis is usually made after the operation. Talazae taught that if a stylet was introduced into Wharton's duct the movements impressed upon the tumor would cause corresponding movements in the stylet, but the rarity of these cases would most probably not suggest to an operator this particular exploration, especially if the tumor had not projected below the buccal floor.

Operations on Salivary Fluids.—A case of adenosarcoma, weighing 90 grammes (3 ounces), was removed with parotid, in a young woman aged 27, by Ramon Martin Gil. [494] No important vessel was ligated. The career of the case was uneventful. A more serious case is one of sarcoma of the parotid, reported by Wyeth, [196] in a woman of 56 years. The external carotid was ligated and the internal jugular also required a lateral ligature. No other remarkable features are presented by the case.

GUMS.

At the International Dental Congress, Paris, Chauvin and Papata [805] read a communication on inflammations of the gums,

their classification, therapeutics, and pathological consequences. The authors conclude that inflammations of the gums, except those of specific and toxic character, are always of traumatic origin; that the almost sole cause is the action of tartar, and that the gravity of the disease depends on the precise way in which this is deposited. Those forms of inflammation of the gums which are of slow progress, medium severity, or hardly noticeable are always produced by concentrated but regular and superficial deposits. On the contrary, inflammations of the gums which run a rapid course and present severe local symptoms have already for origin deeply-seated calculous deposits irregularly distributed over the cementum. This irregularity and the roughness which is its consequence explain the continuous irritation produced, the local abrasions of the gums, and the inflammation of the soft parts around the irritating foreign body, which is always observed in severe cases.

The authors also assert that toxic and specific inflammations of the gums are sooner manifest and are more severe when tartar is present, and the affection is more likely to pass from a chronic, almost unnoticeable inflammation into a more acute form. Moreover, in certain cases a patient would bear without inconvenience a dose of mercury which would develop toxic inflammation where a previous traumatic irritation of the gums existed; that inflammation of the gums may seriously affect the general health of the patient,—may even cause death; that the treatment must first be surgical, and include a thorough cleansing of the teeth, leaving not a particle of tartar to keep up irritation and inflammation; that the surgical therapeutics shall, if necessary, be destructive in character, by the use of a thermo- or galvano- cautery in fungous and hypertrophied states of the gums; that a physician consulted in a case of inflammation of the gums should, even if the inflammation be due to a constitutional cause or of toxic origin, secure for his patient the assistance of a dentist to facilitate, by local remedies, the effects of the general treatment; that the local treatment should always be antiseptic in character, because the continual traumatism results in sphacelus of the soft tissues, sometimes ostitis or necrosis, the decomposition of the tissues rendering the buccal cavity highly septic.

Arthur C. Hugenschmidt[805] read a paper on herpes zoster

of the mouth and gums, which he has observed in two instances. From these two observations of a comparatively rare location of this disease he draws the following conclusions:—

Herpes zoster, or zona, of the mouth presents itself with all the symptoms of a general disease. It is an inflammatory affection of one part and only one side of the buccal cavity, characterized by an eruption of herpetic vesicles, disposed in groups according to a regular direction. The eruption is preceded and accompanied by a neuralgic pain of the whole fifth nerve. The evolution of the disease may be divided into two periods: (1) the period of invasion; (2) the period of eruption.

1. The period of invasion begins by a rise of the temperature; there is fever; general symptoms then appear,—headache, nausea, loss of appetite, etc.; then an intense neuralgia of the whole region of the fifth nerve. The fever lasts three days, and is followed by the period of eruption.

2. In the period of eruption the parts to be involved become excessively painful to the touch; the mucous membrane is red and presents a series of little herpetic vesicles, disposed in groups and having the size of a pin's head; some of them are united; they assume a regular direction, usually the course of the nerve. (in the first case it ran along the course of the buccal branch of the inferior maxillary nerve, and in the second case also along a filament of the same nerve). No vesicles are to be found disseminated in the mouth. The neuralgia, which is general for the first three days, localizes itself as soon as the eruption occurs.

The local lesions are attributed to trophic changes, due to a neuritis of the nerve supplying the involved parts. The only two diseases of the mouth for which it may be mistaken (and then only in the early stage, for later, when the eruption is complete, no confusion is possible) are herpetic stomatitis and aphthous stomatitis.

With herpetic stomatitis we usually have herpetic angina; moreover, the herpetic vesicles are disseminated irregularly on both sides of the buccal cavity; in zona only one side is involved. Aphthous stomatitis, described by Charles David, at the International Congress of Washington, also presents with fever, but the local pains are disseminated and no neuralgia is present.

Pyorrhœa Alveolaris.—The infectious arthrodental gingivitis is studied by Gallippe, of Paris.[13] This chronic suppurative

disease, associated with the dental alveoli, has, since its causes are not distinctly known, received different names. Gallippe, in this work, proposes a new name. That the disease is infectious he believes is true, because the teeth, which become loose, contain fungi in the small canals of the dentine. Two such isolated kinds of fungi produced, when injected beneath the skin of guinea-pigs, abscesses in the bone, the liver, and the subcutaneous cellular tissue. The injection into the gum itself did not produce the specific affection. Arthrodental inflammation is the new name preferred by Gallippe for this old trouble. The disease appears in healthy persons, but especially in syphilitic, scrofulous, diabetic, and ataxic persons, these constitutional conditions preparing the soil for the infection. David[363 Mar.9,'90] calls the same affection Fauchard's disease, reminding us that Fauchard had described it distinctly one hundred and fifty years ago, and that its real nature is not yet known enough to give it a name resting upon a pathologico-anatomical basis.[13 Aug.15]

The whole question of the nature and treatment of pyorrhœa alveolaris, as it is more familiarly designated in English-speaking countries, has been summed up by Magitot,[100 Aug.14] at the Tenth International Congress, Berlin, who reaches the conclusion that this disease essentially consists in a true articular and ligamentous affection, and should be called *alveolar arthritis.* The addition of the word "symptomatic" is in accordance with the fact that it is usually associated with constitutional conditions which predispose the alveoli toward its development. This is especially the case with the rheumatic diathesis, diabetes, albuminuria, hepatic, mucous, and cutaneous diseases, etc.; also syphilis, rickets, and other diatheses, of which this alveolar arthritis is often the only manifestation. In adopting the term arthritis, Magitot accepts the researches of the modern school of anatomists, Owen, Tomes, Ranvier, and Malassez. He also abandons his former views on the periosteal nature of the intra-alveolar tissues, and with this change of base also gives up the name of osteo-periostitis, which he applied to the disease in 1867. He accepts the recent investigations of Gallippe and Vignal, which establish the microbial and infectious pathology of this condition. In regard to the treatment, Magitot has modified his opinion in accordance with the new light, and formulates the therapeutics as follows: (1) the exhibition of

local antiseptics, especially the mercurial bichloride; (2) the application of the thermo- or galvano- cautery to combat the arthritic element; (3) the treatment of the underlying constitutional disorders which so markedly predispose toward the development of the local trouble.

In a practical paper on pyorrhœa alveolaris, C. B. Atkinson, of New York, [805 July] says: "A dark-blue color of swelled or spongy gums should be treated by lancing to relieve the venous congestion, and then injected with aromatic sulphuric acid, full officinal strength. Should suppuration be imminent or present, evacuation of the pus by incision or the injection of hydrogen peroxide is a first step, followed by a delicate application of caustic paste (potassa fusa ⅔ and carbol. cryst. ⅓). A cherry-red color of slightly-puffed gum calls for salicylic-acid solution saturated in 95-per-cent. alcohol. A warm, pink color and no increase in size indicate tannic acid, made into a thick paste with glycerin. The constant exhibition of antiseptic and stimulant mouth-washes is a necessity, and their daily use should be insisted on. The following washes have been commended:—

℞ Hydrarg. bichlor., ... gr. ij (0.18 gramme).
Tinct. calendulæ, ... ʒiv (16.00 grammes).
Aq. dest., ... q.s. ad ℥viij (249.00 grammes).
M. Sig.: As directed.

℞ Hydronaphthol., ... ʒij (8.00 grammes).
Tinct. calendulæ, ... ʒiv (16.00 grammes).
Aq. dest., ... q.s. ad ℥viij (249.00 grammes).
M. Sig.: As directed.

℞ Hydrogen peroxid., ... ℥iv (124.00 grammes).
Tinct. calend., ... ʒij (8.00 grammes).
M. Sig.: As directed.

The hydronaphthol is especially recommended. A general treatment to meet constitutional conditions is not to be forgotten.

The mechanical means indicated are to *fix and immobilize the teeth, to prevent irregularities and elongation.* This may be secured by striking copper caps, made continuous and embracing all of the affected teeth, extending from the occluding surface of the crowns well up in their lingual or buccal surface, as the case may be; but the fixture should be in one piece, extending from firm tooth to firm tooth. Ritter [804 Jan. 1, '98] speaks of the inflammation of the mucous membrane of the mouth and pharynx, and especially of

the lower jaw, in the eruption of the lower wisdom-tooth. He considers the prognosis favorable, if the inflammation is not caused by cramping of the wisdom-tooth for want of growing space. It suffices, then, to cap the molars with caoutchouc, so that the upper wisdom-tooth in biting cannot meet and injure the gum covering the lower wisdom-tooth. If there is want of space the penetrating tooth must be extracted with a right-angled resection forceps. [13 Aug.15]

Nicolas reports a case of *fistula of the gum* which opened in the mamma. [804 Dec.,'88] A lady 32 years of age had had for eight months a purulent sinus, 1 centimetre above the left nipple, which no treatment could stop. Accidentally treating the teeth, the first lower, very hollow molar was stopped up with iodoform, upon which the flow over the nipple smelt of iodoform. The suspicion that the tooth was the cause of the fistula became a certainty when a cochineal solution injected into the tooth colored the flow from the mammary fistula. The tooth was now extracted, and within twelve days the fistula healed.

EPULIS, AND DENTAL DISORDERS.

W. B. Rogers, of Memphis, [849 April] briefly but interestingly discusses the subject of epulis, and presents a report of 5 cases of this disease which came under his observation. He evidently sympathizes with those surgeons who regard epulis a recurring tumor of malignant character and tending to destroy life, as he says: "Strange to say, those writers who dwell on the non-malignant tendency of epulis consent to the same histological characters as are claimed for it by those of opposing creed; and it seems to be definitely settled that epulis belongs to the sarcomatous group. It is a myeloid sarcoma, composed of fibrous tissue and myeloid cells, the former predominating, and it would appear occasionally to exist almost to the exclusion of the latter, and *vice versâ*. The greater the preponderance of myeloid cells, the greater the tendency to malignancy. Histologically, epulis is a recurring malignant tumor,—a sarcoma. Clinically, early removal means a cure. When neglected the tendency is to destroy life."

M. H. Richardson, of Boston, [99 Oct.2] reported a small tumor of the upper jaw, which gave rise, in the Boston Society for Medical Advancement, to some instructive discussion on the operative treatment. Richardson contended that in no class of tumor is the

advantage of a thorough dissection more apparent. "I recall at least 4 cases of epulis, operated upon by myself during the past year, in all of which an attempt had been made to remove the growth without sacrificing the teeth, and in all there was prompt recurrence. Thus far the prompt removal, after drawing the teeth from whose base the tumor had sprung, had been effectual, and was likely to continue so. In all cases of tumor of this kind removed at the hospital from 1878 to 1888, that I was able to follow, there had been neither recurrence nor death. It does not follow that it will be necessary to remove the teeth in all cases. Where the growth appears on both sides of the alveolar process, at least one of the teeth, and often both, must be drawn to give free access to the periosteum. In this disease the dangers of palliative delay are not great, on account of the fact that it has, in the beginning, at least, only local malignancy." In the course of the discussion, Stedman said that he had occasion to observe in pregnant women tumors of the gums, with appearances almost identical with epulis, bleeding at the touch, and yet disappearing on delivery of the child. W. L. Richardson confirmed Stedman's experience.

F. D. Rodriguez, of Havana, $\frac{459}{\text{Oct.}}$ reports 2 cases of epulis, and gives the following practical conclusions from his observations: 1. That in none of his cases of epulis has he observed evidences of general or secondary invasion, and that it has been sufficient to remove the tumor and to extract the roots or teeth with which they were connected to cause the arrest of the disease. In not one of the numerous cases that have come under his observation has he known of recurrence. 2. In all cases which he has treated there has been a great neglect of the hygiene of the mouth. This has been the case especially with individuals working in copper, or cutlers, whose teeth accumulate a characteristic tartar which appears to predispose them especially to these neoplastic formations.

I. Hutchinson, Jr., $\frac{6}{\text{Apr.}}$ showed figures and microscopic preparations from a case of myeloid epulis, typical of myeloid sarcoma, with giant-cells. Nodules of bone were observed in the slide. It was said that these tumors did not ossify, but he had found the reverse to be the case. The plum color of the tumor was very characteristic. A case of epithelial epulis in a woman aged 58, and successfully treated by partial excision of superior maxilla, is reported by Malloch. $\frac{39}{\text{Apr.}}$

Necrosed Teeth.—W. P. Beach[157 July] describes a case under his immediate observation for the past ten years, and illustrating very forcibly at least one of the dangers of retaining necrosed teeth in their sockets. About nine years ago the second bicuspid of the right upper jaw contained a cavity which was filled with amalgam and shortly afterward began to ache severely. He insisted on having the filling removed and the nerve killed, which was done. A few months later the tooth died and blackened, and a sinus opened through the gingival mucous membrane in the region of the root of the tooth. This state of affairs continued about two years, when a series of small abscesses occurred on the right pinna, which lasted for about one month and numbered ten or twelve in all. He recovered from the attack and was tolerably comfortable for a few months, when the same experience was gone through with, but this seizure was more prolonged and severe; there were marked constitutional symptoms, and a large abscess made its appearance in the right temporal region. These attacks returned at intervals of a few weeks or months for several years, each one being slightly severer than the last, and finally involved the scalp of the right side. About this time a large abscess made its appearance on the knuckle of the little finger of the left hand, and the man commenced to show signs of marked reduction of health and strength. Beach further noticed that the vent in the mucous membrane closed, and that shortly after such closure the abscesses made their appearance. At last it was decided to have the tooth extracted, which was done nearly a year ago, and since that time the patient has been in perfect health. The root of the tooth was very much softened and roughened, while the tooth-socket and tissues surrounding it were quite sensitive to pressure. In Beach's opinion this was a case of septicæmia, the result of pent-up pus in the neighborhood of the dead root.

Dental Irregularities.—Talbot, of Chicago, [1139 Jan.] regards as fallacious the following conclusions on this subject: 1. A high, contracted vault results from thumb-sucking. 2. That dental irregularities are produced by a force originating in the sphenoid bone and acting upon the intermaxillary bones.

Tooth-Cysts.—Parreidt [804 Nov., '89] states that tooth-cysts sometimes undergo such changes that the so-called parchment-crackling is often wanting. Such cysts can be considered as chronic central

abscesses of the jaw, of which he gives several examples. In one case it was doubtful whether there was a sarcoma, odontoma, or a cyst. In regard to the etiology, Parreidt points to traumatic influences which especially give rise to the production of follicular cysts. The cure of periosteal tooth-cysts results sometimes spontaneously after extraction of the affected tooth. Dieck [804] describes a cyst produced by an abnormally situated normal tooth. A girl of 13 years old had a large swelling on the right side of the alveolar process on the lower jaw, corresponding with the yet firmly-planted second deciduous molar. It was discovered after extraction of this tooth that the corresponding normal molar lay obliquely in a spacious bone-cavity underneath it, so that the chewing surface was turned toward the face. The cavity was lined by a solid membrane of connective tissue, which was removed.

Extraction of Teeth.—Nothing new has been contributed on the *technique* of this operation. Scheff [910] says he succeeded, in 3 hæmophilic subjects, in stopping the bleeding by injections of hot water.

Pillin [842] relates 5 cases occurring in his practice of secondary hæmorrhage following tooth extraction. Three of the patients were members of the same family, but it is not mentioned whether there was any history of hæmorrhagic diathesis. The cases are interesting on account of the length of time elapsing between the operation and the hæmorrhage. The first, a man aged 28, had profuse bleeding, commencing on the fifth day; a brother, aged 31, notwithstanding that the sockets were plugged immediately after the extraction, bled on the eighth day. Of the two other cases, hæmorrhage occurred on the third and fifth days respectively. The treatment successfully adopted was plugging the sockets with cotton-wool saturated with tincture of perchloride of iron, and fitting over this a plate made of Stent's composition, lined with a mixture of tannin and gum tragacanth. Stent's composition is a preparation used by dentists for making models of the mouth. It is harder than wax at the temperature of the body, and not so flexible as gutta-percha, and therefore makes an accurately-fitting and easily-applied plug, and can be readily retained in position by keeping the jaws in contact by an ordinary four-tailed bandage.

The treatment of the wound requires, as a rule, no special attention; yet there are particular cases in which an after-treatment

is necessary, and it is always wise to proceed antiseptically in the operation. McPherson, $^{1}_{Nov.22}$ dwelling on the importance of prompt treatment in alveolar abscess, urges that the proper treatment in these cases, when the attack cannot be aborted in its early stages, is the extraction of the affected tooth. H. C. Quimby, Liverpool, $^{6}_{Dec.28,'90}$ argues in favor of the conservative treatment of the painful diseases of the teeth, and offers a striking contrast to the aggressive attitude assumed by McPherson.

Antiseptics.—Miller, of Berlin, $^{805}_{Aug.}$ contributes a communication on experiments on the comparative value of various antiseptics in the treatment of diseased teeth. The antiseptics which he has thus far experimented with are arranged in the following classes: 1. Those pre-eminently active in preventing decomposition of pulp-tissue: bichloride of mercury, cyanide of mercury (?), bichlorphenol, sulphate of copper, phenol (carbolic acid), oil of cloves, chloride of zinc, campho-phénique (?), hydronaphthol (?). 2. Those of doubtful value: thymol, salicylic acid, eugenol, A- and β-naphthol, acetic tartrate of aluminium, 5-per-cent. solution of bichloride of mercury, and possibly some essential oils. 3. Those nearly or quite worthless: iodoform, basic aniline, coloring matters, borax, boracic acid, chloride of lime, peroxide of hydrogen, sozoiodol salts, iodol, tincture of iodine, spirits of camphor, naphthaline, the double cyanide of mercury and zinc, and many essential oils. Resorcin, thallin, sulpho-carbolate of zinc, oil of birch, iodide of sodium, nitrate of sodium, and some other substances have not yet been sufficiently tested to permit of an estimate of their value, though some of them seem to promise well. Miller calls attention, also, to the instability of antiseptic compounds, and shows that it is a fallacy to believe that an antiseptic placed in the cavity of a tooth or in a root-canal, and sealed with a water-tight substance, remains unchanged or retains its antiseptic action indefinitely.

Miller $^{805}_{Apr.}$ contributes a short paper on the action of hydrogen peroxide upon the teeth. He refers to W. H. Rollins, who first called attention to the fact that the enamel of the teeth loses its polish under the action of peroxide of hydrogen. The intense and solvent action noticed by Rollins was probably due to the fact that he used the technical and not the medicinal preparation of the peroxide, the first exhibiting strong acid reaction,—as much as 3 per cent., of hydrochloric acid, according to Miller,—who concludes

that there seems to be no room for doubt that neutral, or nearly neutral, solutions of peroxide of hydrogen act upon dentine by destroying or dissolving the organic matter by which the lime-salts are liberated or their bond of union destroyed. At all events, the agent in question should be used with some caution, and when applied repeatedly, or when used as a mouth-wash, as suggested by Busch, the necks of the teeth should be particularly watched and the use discontinued in case the disintegration begins to show itself.

H. E. Vaughan, Springville, N. Y., $^{805}_{Apr.}$ endeavors to prove that sodium silico-fluoride is, when properly used, capable of becoming one of the most useful salts in the dental pharmacopœia. As a disinfectant it has been shown to be powerful enough to markedly antagonize the germs of putrefaction; as a coagulant, to be non-escharotic; as a *deodorant*, strong enough to destroy the most penetrating of putrefactive odors; as a stimulant, strong enough in full solution to cause new tissue to form, and yet not act as an irritant to surrounding tissue. It is practically unchangeable, the only change being that noted regarding solubility, which is not of the slightest practical importance.

ANÆSTHETICS IN DENTAL PRACTICE.

The past year has been prolific in papers and discussions on local and general anæsthetics in dental practice. Cocaine has particularly claimed a large share of attention. It can now be safely stated that the proper status of cocaine as a dental anæsthetic has been thoroughly established.

Bleichsteimer $^{1140}_{Sept.,'89}$ recommends, for antiseptic purposes, that the solution of muriate of cocaine be made with $\frac{1}{5000}$ solution of mercuric chloride. The action of the injections is not so favorable when the injection is made in a hyperæmic or tumefied gum. The anæsthesia usually lasts about ten minutes. A 5-per-cent. solution of cocaine is quite sufficient. As a general rule, not more than 5 centigrammes (1 grain) should be injected at one time. If half an hour is allowed to elapse between the injections, the dose can be carried to 15 centigrammes (3 grains). One should make several punctures, and inject the slightest quantity of cocaine in each puncture. Extraction should follow the injections as soon as possible. If one has several operations to perform, he should

not introduce the needle in the neighborhood of the wounds produced by the previous extractions, so as to prevent a too rapid absorption of the drug. In case a collapse should occur, the patient should be immediately placed in a horizontal position, alcohol or wine given internally, and nitrite of amyl by inhalation. In cases of hysterical attacks it is well to give an injection of 10 drops of a 10-per-cent. watery solution of aqueous extract of opium.

Poinsot, $\frac{1140}{\text{Sept.,'89}}$ Paris, made a communication on the injection into the gum of pure cocaine. The formula recommended by the author is:—

℞ Oleonaphthine (liquid vaseline),
Arachis-oil, ... āā 50 centigrammes (7½ grains).
Pure cocaine, ... 5 centigrammes ($\frac{3}{4}$ grain).

By the use of liquid vaseline the author finds that he is able to localize the action of cocaine at the point of injection, or, at the utmost, in the parts immediately surrounding it, and to prevent in this manner its general action, except in very rare cases. It also prevents a sphacelus or necrosis of the alveolar borders. It is important to inject with the greatest care. With the formula recommended above it is necessary to dissolve the cocaine by placing it in a little hot-water bath. The needle of the syringe should be as short as possible and of the smallest diameter, and it and the part of the gum where the injection is to be made should be washed with absolute alcohol. The injections must be made very slowly, and a number of them are to be made around teeth which have multiple roots. We may know when the gums are sufficiently injected by their bleached appearance. To obtain complete anæsthesia, we must wait from four to eight minutes after the injection has been made. We can find whether the anæsthesia is complete by cutting the gum around the tooth with a lancet, or by touching the same with a red-hot iron. Cocaine should not be used in cases of hæmophilia. It is also well only to operate on one tooth at a time, and not to extract several at the same sitting. If unpleasant symptoms occur, ammonia is to be given by inhalation. Later, we may give 6 or 8 drops of laudanum in a cup of strong black coffee, without sugar. Local anæsthesia is more complete when the injection has been made in thick tissues in a physiological state. It is much less complete when the mucous membrane is thin and in a chronic pathological condition. The teeth of the superior

maxillæ are extracted with much greater success as regards sensibility than those of the inferior, especially the lower molar and wisdom teeth. This is the result of an experience of nearly 2000 cases in which this method has been used.

Richard Chauvin [1140 Sept.] stated that, notwithstanding the researches of Libermann and Geissel, who both experimented with cocaine obtained by synthesis, or with cocaine purified by other processes, one must always use this drug with great caution. The accidents which are observed by the use of these chemically-pure preparations are of an exclusively nervous kind. As by the purification of cocaine the toxic alkaloids, ecgonine, isatropic cocaine, which are cardiac poisons, are eliminated, there is no reason to be surprised by the disappearance of the cardiac toxic symptoms. The author also thinks that it is indifferent whether cocaine be administered in the form of a salt, such as the muriate of cocaine, which is soluble in water, or the alkaloid cocaine itself, which is soluble only in a 2-per-cent. quantity in oleonaphthine or liquid vaseline, provided the product is a chemically-pure one. The best means of preventing accidents is to introduce the hypodermatic solution very slowly, and to give only moderate doses,—not more than $\frac{1}{2}$ grain (0.03 gramme); and, if trouble is anticipated from the nervous condition of the patient, it is better to take about five minutes to introduce the whole quantity of the solution,—that is, about $\frac{1}{10}$ grain (0.006 gramme) every minute. In this manner the injection may be continued as soon as the first toxic symptoms appear, while the local anæsthesia is at the same time more complete. With pure products, if the nervous symptoms are not thus completely prevented, they are very much diminished.

Arthur C. Hugenschmidt [1140 Sept.,'89] divides the accidents of cocaine under two classes: (1) local; (2) general. Local accidents (molecular necrosis of the tissues or necrosis of the alveolus) can be prevented by washing with an antiseptic solution (bichloride, $\frac{1}{1000}$) the parts to be operated upon a few minutes before the injection. The solution must not be over two or three days old, and in preparing it even the distilled water should be boiled for at least five minutes before being used. General accidents observed are of cardiac, respiratory, nervous, and calorific origin.

Schlenker [1115 p.808,'89] had, of 297 cases in which cocaine was used, 3 per cent. of violent and 5 per cent. of mild cases of poisoning. He

injects mostly 0.05 gramme ($\frac{2}{25}$ grain) of cocaine; if injection is employed again in the same person later on, larger doses, 0.07 to 0.1 gramme (1 to $1\frac{7}{10}$ grains) are given, because by repeated use, even if one year has passed, larger doses may be borne. The after-pains, which frequently appear after extractions in periostitis, are not observed when cocaine has been previously used.

In a paper on local anæsthesia by nitrous-oxide gas, G. L. Curtis, Syracuse, New York, 808 July suggests that a blast of nitrous-oxide gas, under high pressure, thrown upon a tooth or tooth-pulp, has the effect of producing local anæsthesia by depriving the tissues of moisture, and thus rendering them insensible to pain. The pressure of the gas in the cylinder in which it is supplied in a liquefied state is, at ordinary temperatures, about 1000 pounds to the square inch; that is, when the cylinder is full. This is ample for the purpose. Dunogier, of Bergerac, France, 1140 Sept., '89 says that some drugs have a powerful action on the fifth nerve, so that in certain cases their action is very precise, giving relief in a few hours to pain which might have lasted several days and necessitated finally the extraction of the painful tooth or the destruction of its pulp. In his practice, whenever the local treatment appears insufficient after repeated trials, he gives the following preparation:—

℞ Aconitine, crystallized, . . .	$\frac{1}{4}$ milligramme	($\frac{1}{250}$ grain).
Gelsemine, ...	1 milligramme	($\frac{1}{65}$ grain).
Valerianate of quinine, . . .	5 centigrammes	($\frac{3}{4}$ grain).

For one pill.
One to three pills for an adult in the twenty-four hours.

As local anæsthesia has its decided limitations, and cocaine is often unreliable and is contra-indicated in even the simplest cases, it is natural that the general anæsthetics should still be watched and studied with careful solicitude. Nitrous oxide, of course, dominates the field in all countries, but it is to be noticed that the mixtures of nitrous-oxide gas with oxygen (noticed in the last ANNUAL) and the bromide of ethyl are being tentatively tried in England and Germany.

DENTAL REFLEXES.

The anatomical relations of the dental nerve-supply in its relation to dental reflexes is minutely and clearly presented by M. Macnaughton Jones, 912 Aug. and the ocular, nasal, and aural perturbations that may arise from dental irritation are carefully

considered and explained. The reflex affections which occur during difficult dentition in children, such as general convulsions, reflex bronchial irritation, diarrhœa, epidermal eruptions, strabismus, paralysis, trismus dentium, tinnitus aurium, and dental headache, are more prominently noticed. The case which prompted this contribution is an example of a reflex irritation from affection of the teeth, which has hardly received that consideration which the importance and frequency of the relationship demands. Lauder Brunton [408] drew special attention to those forms of headache which are dependent upon disorders of the eyes and teeth, as well as those which are due to disorders of digestion. His attention was attracted to the relation of headache and carious teeth by his discovery of its occurrence in his own person, finding a commencing caries in the last molar tooth on the same side as the cause of the headache. "Not infrequently," he says, "when I have pointed to a decayed molar as the origin of the headache, the patient has said, 'But I have no pain in the tooth;' and to this I usually answer, 'It is quite natural; you get the toothache in another part of your head.'" Brunton has noticed as the special seat the temporal and occipital regions. This location he attributes to an affection of the vasomotor branches of the temporal and those of the occipital artery through the sympathetic system, a vascular spasm causing pain in the head. He has noticed a tenderness in the scalp over the affected region, and this Jones has verified. Brunton says that a decayed molar in the lower jaw usually causes temporal headache rather farther forward than that caused by the lower jaw. Caries of the incisors, of eye-teeth, is more likely to cause frontal or vertical headache. There is one strong clinical feature which assists in the differentiation between ocular and dental headache, viz., the frequent occurrence of megrim in the former and its absence in the latter.

As a result of my personal observation, I would say that the occipital headache is always more likely to be seated in the side of the head corresponding to the irritating tooth.

A case of closure of the jaws from spastic irritation of the masseter, due to irritation of an unerupted wisdom-tooth, is reported by Pennock, of Victoria, Australia. [267] Nov. 15, '99 The masseteric contracture was relieved after removal of the wisdom-tooth. Excessive expansion of the fangs was the cause of the irritation, the angle being 30°.

obtained, and no more than 15 to 20 grammes (3 drachms 51 grains to 5 drachms 9 grains) are necessary for an ordinary operation. The sleep may thus be prolonged for many hours. After waking there is no disagreeable feeling. Chloroformization is thus rendered harmless, and persons suffering from cardiac or respiratory diseases can be anæsthetized without danger.

In regard to the fatal after-effects from chloroform, Thiem and Fischer $_{\text{Dec.2,'99}}^{41}$ state that the urine can show evidences of chloroform even twelve days after the narcosis, and as long as this toxic material is in the system danger from it is to be feared. Chloroform reduces Fehling's solution to black oxide of copper. It can be detected six hours after administration, and after prolonged narcosis it may be found for from three to eight days. The isonitric reaction shows that it exists in the urine in an unchanged condition. They deduce that chloroform should be looked upon as a necessary evil, and not be employed if it can be avoided; also that a person should not receive chloroform again until the previous amount is entirely eliminated, as shown by its action on Fehling's solution.

In the urine of persons under chloroform narcosis for a protracted period, *i.e.*, one and a half to two and a half hours, Kast $_{\text{Dec.2,'99}}^{34}$ found a very decided increase in organic and inorganic sulphates. He believes that the tissue changes are materially affected by prolonged chloroform narcosis.

Iterson-Leiden $_{\text{Apr.2}}^{69}$ claims that chloroform vapors are broken up into chlorine and carbonic oxide by the effect of gaslight. This causes bronchial irritation in those present, induces asphyxia in the narcotized patient, and has even produced death. Sometimes the injurious effects will only manifest themselves some days after. Two cases are cited by Wade $_{\text{May}}^{192}$ in which, through the chloroform vapors coming in contact with gaslight, the patients became dyspnœic and the assistants suffered from bronchial irritation.

The products of the decomposition by gaslight are stated by Kunkel $_{\text{Apr.4}}^{34}$ to be hydrochloric acid and carbon dioxide; carbon monoxide is never found. It requires only 0.1 per 1000 of hydrochloric acid to produce bronchial irritation, and to produce this only 10 grammes (2 drachms 34 grains) of chloroform in 70 cubic centimetres of air are required. A. Kelly $_{\text{Mar.30}}^{59}$ reports a case where chloroform had been administered to a boy, 15 years old,

ilitic Necrosis," by G. Frank Lydston [805 Aug.]; "Clinical Conditions Common to the Throat, Mouth, Nose, and Ears," by Harrison Allen [805 May]; "Studies on the Anatomy and Pathology of the Tusks of the Elephant," by W. D. Miller, Berlin [805 Sept.]; "Diseases Incident to the First Dentition," by James W. White. [805 Nov.]

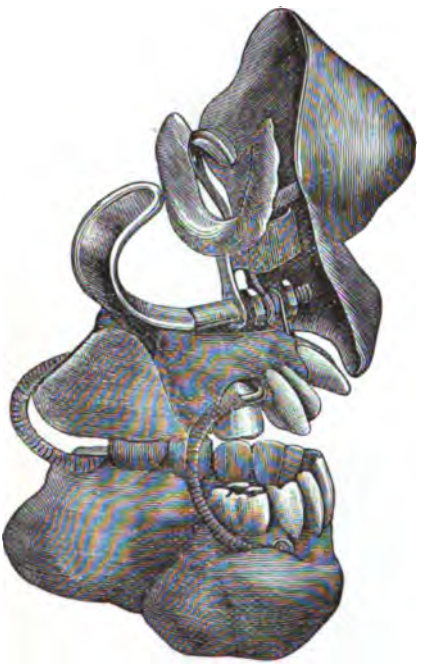
SURGERY OF THE FACE.

Péan's [100 Jan. 16] case of resection of the bones of the face is well

PÉAN'S CASE, AFTER OPERATION.
(*Gazette des Hôpitaux.*)

illustrated by the accompanying cuts. The sphenoid, the three maxillaries, and the malars were the seat of osteo-fibromata following dental heteroplasia. The patient, a female aged 32, dated the beginning of the trouble from the age of 9 years. In 1884 the right superior maxillary was removed, but the disease recurred in a short time and involved the left upper jaw. When the patient was first seen by Péan, in November, 1888, her face pre-

sented a truly horrible appearance. The superior maxillary on the left side was much enlarged, and of the size of a fœtal head. The inferior maxillary was also greatly enlarged; the cheeks, eyelids, and nose were pushed inward, and the orbital, buccal, and nasal cavities were almost completely closed. The alveolar arches were thickened, and the teeth were loose. Mastication, deglutition, phonation, and vision were greatly interfered with, and severe pain was present. Owing to the extensive involvement of the bones of the face, it was thought necessary to remove the maxillaries, the malars, and a portion of the sphenoid. Inasmuch as no operation of this kind had been recorded in the literature of surgery, and the patient was extremely feeble, much doubt was felt as to the outcome of the procedure, which was undertaken only at the earnest solicitation of the patient. At the first operation, which was performed on December 14, 1888, Péan exposed the upper jaw by a median incision through the upper lip and nose, hæmorrhage from the labial and nasal vessels being controlled by the application of forceps. The buccal mucous membrane was then detached with bistoury and scissors, the tumors exposed, and the prominent portions excised with a strong, short bistoury, the remaining portions and the bone being removed piecemeal with gouge-forceps. In this manner the superior maxillary, the malars, the pterygoid processes of the sphenoid, the naso-orbital septum, and the floor of the orbit were excised. It was then seen that the upper portion of the tumor involved the compact inferior lamella of the sphenoid, which was also removed, and, much to his astonishment, the author found a small molar tooth lodged in the spongy tissue of the sphenoid.



PROTHETIC APPARATUS USED IN PÉAN'S CASE.
(*Gazette des Hôpitaux.*)

It is reasonable to suppose that this tooth was the cause of the neoplasm. The presence of such an anomaly is probably without parallel in man, although not infrequent in some animals, notably the horse.

At a second sitting, which occurred six weeks later, Péan removed the lower jaw by an incision extending from one angle to the other, at the level of the inferior border. The periosteum was stripped off, the tumors excised on both sides, and the rami resected with the osteotome. In the symphysis a canine tooth of the second dentition was found, which was probably the cause of

BLAIR'S CASE OF CICATRICIAL DEFORMITY FROM GANGRENE OF CHEEK, WITHOUT PROTHESIS.

BLAIR'S CASE WEARING PROTHETIC APPARATUS (ARTIFICIAL CHEEK).

(*International Dental Journal.*)

the second tumor. The presence of this anomaly is the more surprising, inasmuch as all the teeth of the lower jaw were complete. The result of the operation was good, the wounds healed by primary union, and no recurrence had taken place in fourteen months. It is a well-known fact that these tumors, if completely removed, show no tendency to return, even when, as in this case, they contain sarcomatous elements. To correct the deformity, Michaels, a dental surgeon, constructed an ingenious apparatus, consisting of an artificial upper jaw, nose, and lower jaw, so that the patient was enabled to speak and swallow without difficulty.

An interesting case of facial deformity corrected by prothetic apparatus is reported by L. P. Blair.[808 Sept.] The patient, a female aged 26, had a gap in her face extending from median line of lips to angle of mouth, thence upward to level of infra-orbital foramen and downward to level of myelo-hyoid ridge of lower jaw. The appearance is shown in figure. The cause appears to have been gangrenous stomatitis induced by mercurialism in the course of typhoid pneumonia, in childhood. Two attempts had been made already to cover the opening by plastic operation, but the result was only partially successful. The author took an impression of the face, and from this was able to make an excellent obturator, which served, after it had been carefully painted of a flesh tint, to save the appearances and obturate the cicatricial opening, as is shown in cut. (See preceding page.)

In the course of an extirpation for epithelioma of the face, Gerster[101 Sept.] referred to his experience and treatment in wounds of the face. He says: "From a long experience, both in hospital and private practice, I have come to the conclusion of never dressing a plastic wound on the face. I simply dust the line of incision with powdered iodoform. The first condition in these wounds is that hæmorrhage be absolutely stanched. There should not be a drop of blood at the time of closing the wound. When you have stopped all hæmorrhage you may apply the sutures. In the case of wounds of the face in children I use iodoform with glycerin. The bloody serum which exudes from the wound will form a sort of paste over it, and a crust will soon form along the line of the wound, which will constitute the best antiseptic dressing that can be put on. The only precaution I take is that the flaps be brought in direct apposition without any tension, and maintained thus by very fine silk or catgut sutures. The same procedure I apply in all operations about the face, and the harelip-pin, which is spoken of in the text-books, I consider an instrument of torture which should be abolished."

A case of epithelioma of the inner angle of the left eye, treated by extirpation and subsequent grafting of a dermal graft (Wolff's—whole thickness of the skin to the adipose layer), is reported by Gangolphe, of Lyons.[211 July 27] After the excision of the growth, the graft, which was borrowed from the inner surface of the arm (size of a circle about $\frac{1}{4}$ inch in diameter), was immediately transplanted

and stitched with five sutures. The graft took excellently, and surface completely covered. The subsequent result as to recurrence is not stated.

Szadek, corresponding editor at Kiew, Russia, reports the beneficial effects of resorcin in the treatment of rodent ulcer, 15 grains (1 gramme) of resorcin to 1 drachm (4 grammes) of vaseline.

In a paper on the "Neglected Advantages of Caustics in the Treatment of Malignant Diseases in Certain Localities," [12 Jan.] Matas has reported some cases illustrating his experience in the treatment of rodent ulcer with the aid of caustic pastes, and in which he is able to confirm Rutlin's opinion in favor of the caustic for this peculiar type of malignant disease. Since the publication of this paper increased experience has only served to make more firm his former opinion. The paste usually employed by the author is that known as Felix's paste. The formula is as follows:—

℞	Starch,	87 parts.
	Wheat-flour,	112 parts.
	Mercury bichloride,	1 part.
	Zinc chloride (gran.),	110 parts.
	Iodol (pure),	10 parts.
	Croton chloral,	10 parts.
	Camphor bromide,	10 parts.
	Carbolic acid,	10 parts.

Mix and add gradually a sufficient quantity of distilled water to form a homogeneous mass, without lumps, of the consistence of putty.

This paste, which should be made neither too soft nor too hard, will keep indefinitely. This paste is effective only on surfaces divested of their epidermal covering, and its effect can usually be measured by the length of time that it is allowed to remain. It has certainly high penetrating power, and should be used carefully over the thinner portion of the skull or important blood-tracks, because on the removal of the slough serious consequences may follow.

The successful removal of an anterior encephalocele is reported by Mittendorf, of New York. [40 July] Out of 93 cases collected by Hurd only 16 were of the nose. The three varieties of these tumors, arranged according to their frequency, are (1) encephalocele, (2) hydrencephalocele, (3) meningocele.

The result of the case speaks strongly for operative interference in cases of meningocele, and likewise in those cases of encephalocele where a comparatively small pedicle exists. The

operation should be performed as early as possible in these cases, and there is very little danger of meningitis if the necessary antiseptic precautions are observed.

An uncommon case of dermoid tumor of the fourth branchial cleft is reported by P. W. McNamara, Chicago.[779 May] On cross-section after removal it was found to consist of a well-defined wall with epithelium, somewhat like that of the integument. Its contents were granular, bony matter, a few hairs, and an imperfectly developed tooth.

Two branchial cysts and a branchiogenous carcinoma are reported by L. Hektoen.[779 May] The cases are distinguished as: 1. Cyst of the third branchial cleft; excision; primary union. 2. Cyst of the third branchial cleft; extirpation and recovery. 3. Branchial carcinoma; partial extirpation. The case of branchial carcinoma illustrates well the destructive characteristics of this rare variety of neoplasm, *viz.*: "The development in a man of 40 years of a primary tumor of the upper anterior angle of the neck, with spaces in its interior; the histology of the growth was that of a squamous-celled carcinoma; the skin covering the tumor was intact and there was no carcinoma in any of the adjacent structures."

The excision of a branchiogenic cyst is reported by McBurney, New York,[9 July 12] who says that "in the treatment of this condition such methods as the seton, which have for their object the establishment of inflammatory action within the sac for the purpose of obliterating it, should be discarded. Evacuation of the contents and the injection of iodine are insufficient and unscientific procedures, for the cysts often have prolongations running deep into the tissues of the neck which cannot be reached by such means. Treatment by simple incision and drainage has so often failed that it holds out no special inducements. If the wound were packed with gauze the obliteration might be only superficial, and a second operation is much more difficult on account of the inflammatory thickening of the tissues. Some cases of excision of the cyst are very simple, the tumor shelling out with comparative ease; while others are so difficult as to force the boldest operators to abandon the operation. One difficulty frequently met with is the attachment of the cyst to the jugular vein. This vein is readily displaced and is often emptied of blood by the tension made by the tumor;

so that a safe dissection of this region is extremely difficult. The plan proposed in this case, which was apparently an easy one, was to dissect down to the tumor and then decide upon the propriety of performing a complete excision. If this were found too dangerous, the exposed portion would be cut off and the wound allowed to granulate in the hope of securing obliteration of the remainder."

Sawicki[569 No. 11] reports 2 cases of idiopathic blood-cysts of the neck. The first case, a male aged 53 years, presented a tumor, the size of an apple, on the left side of the neck. After one aspiration the tumor refilled, but finally disappeared spontaneously. The second case, a farmer aged 23 years, presented a similar history. The cause appears to lie in some abnormality of the lymphatics and their accompanying blood-vessels.

A very instructive case of dermoid cyst of the supra-hyoid region, treated by extirpation and followed by recovery, is reported by Voituriez, of Lille.[220 Dec. 15] The author rejects the theory of Verneuil and Cussat, who believe that the median cysts originate by epidermal inclusion pinched in during the process of suture of the pharyngeal arches in the median line. He accepts the teaching of His, that these cysts are due to the persistence of the thyreoglossal duct.

An epithelioma, probably originating in a branchial cleft (third ?) was extirpated by S. E. Evans, of Cincinnati.[119 Oct. 15]

RHINOPLASTY.

In the ANNUAL for 1890 the work on rhinoplasty, by S. Trilharandes Motichand Shah, Junagadh, India, was only mentioned. The author has had an exceptional experience in the treatment of nasal deformity, and the book is certainly worth notice. The operations reported were performed for a disfigurement caused not by the ravages of disease, as is usually the case in European countries, but by willful wounding, either from spite in revenge for injury, or as an outrage inflicted on innocent individuals by miscreants, known in Junagadh State as Makrain outlaws. The 100 operations reported in the book were accumulated in the course of four years. In his early trials of rhinoplasty he formed the new nose of flaps taken from the cheeks; but after the tenth operation, not feeling satisfied with the results, he was led

to resort to the old procedure, in which the flap is dissected up from the forehead. This operation takes much less time to perform, a much more sightly nasal organ is thus formed, and the subsequent cicatricial disfigurement is less apparent, particularly in natives of the East, in whom the scar on the forehead may be easily concealed by the turban, or some other head-covering. The merit of the author's work is, therefore, mainly in the direction of perfecting the technique of the old Indian method.

A rather novel method of performing rhinoplasty in a child aged 5 is described by D. O. Ammann as having been successfully performed by Wolff, of Berlin. [34 Mar.4] The object of the procedure was to obtain an osseous support for the new nose, and thus prevent the secondary shriveling which usually follows the ordinary skin methods. Koenig's bone-skin flap was discarded because it was too disfiguring. The method of Wolff consists in making a transverse incision completely across the root of the nose, and extending some distance beyond on each side. Two vertical and parallel incisions are now made, which meet another transverse cut, which extends on each cheek to the anterior wall of the antrum. This will leave two lateral flaps and an intervening portion of healthy skin. The nasal bones and overlying soft parts are now detached from their connections with a chisel, and the flap, consisting of bones and skin, will be deflected down so as to present the raw surface in front. The flaps which have been detached laterally are now brought over, and the new nose then secures a good resisting substratum.

The reconstruction of deformed noses by grafting a portion of the finger is the subject of a practical paper by James P. Parker, of Kansas City, Mo. [9 June 7] This procedure, which is comparatively old and well established as one of the methods of correcting nasal deformity (having been first practiced by Sabine, of New York, several years ago), is erroneously claimed as original and new by the author. Sufficient mention of the method was made in this section of the ANNUAL for 1890 to convince the author of the correctness of this criticism. He relates a case, however, which is very creditable to the method and the author's skill.

B. Merrill Rickets, of Cincinnati, Ohio, [61 June 21] contributes an interesting paper, with illustrative cases, on the external surgery of the nose.

Ohmann Dumesnil[109 Nov.] reports an aggravated case of acne rosacea (rum-nose) in the third stage, in which the deformity is produced by the hypertrophy of the tissues, the ducts of the sebaceous glands becoming enlarged, their orifices gaping. Lobules are formed, the entire integument being thickened and rough, its surface assuming a greasy, shining appearance. The patient, aged 72 years, sought relief by operative treatment on account of the serious impediment to respiration caused by nasal obstruction. The operation, performed by Bernays, consisted in the removal of the lobes of the tumor, leaving a small flap of the integument of each in order to cover the tumor mass. This flap in each case was derived from the lower part and laid up so as to bring the line of stitches at about that portion of the nose which would correspond to the sulcus of each ala. In the case of the middle lobe, of course, the line of sutures was directly across the nose. The dissection of the skin-flaps was carefully done so as to have as thin an integument as was consistent with the nutrition of the parts. Healing occurred *per primam*, the dressing having been iodoform collodion.

Gideon Becsi[57 May 19] reported to the medical section of the Hungarian Society of Natural Sciences 4 cases of rhinoplasty. In 1 case the tip of the nose had been bitten off in a love-quarrel; in the others malignant disease had caused the defect. In the first, the alæ nasi were simply pushed forward, after Balassa's method; in the others the defect was covered by a forehead flap.

LIPS.

Harelip.—As usual, the annual contingent of contributions to this topic has been abundant, and several papers of unusual interest have appeared. Carl Beck, of New York,[150 Apr. 3] wrote "On the Early Operation for Harelip and a Method of Performing it with the Least Danger," and furnishes a convincing argument in favor of the early operation. The table of cases which is appended to the author's monograph supports his contention, and, in my opinion, clearly establishes the superiority of the early over the late operation, making it a duty to operate at the earliest possible moment after the child's birth. The author reviews the varied and contradictory field of surgical opinion *pro et contra* early interference. He lays the blame of the contradictory evidence on a defective technique, which in many cases allows of an excessive

loss of blood or leaves a shortened and defective lip which unfits the child for nursing. This technique the author believes he has improved to such an extent that the hæmorrhage (the most dangerous factor in the mortality) is reduced to a minimum. The author's method consists, essentially, in this: that he introduces a prophylactic suture before the freshening of the edges of the cleft is begun, so that the moment the dissection is ended the raw surfaces are brought in confrontation and the bleeding completely suppressed. With the perfect control of the hæmorrhage that is obtained by the adoption of the prophylactic suture, the details of the operation can be more carefully attended to and better cosmetic results obtained.

Thomas H. Manley, of New York, has also been a prominent contributor on the subject. [1] [101] [202] [61] The operative treatment of simple and complicated harelip received further treatment in 1890 by Edmund Owen. [6] In speaking of double harelip, with projecting intermaxillary bone and prolabium, Owen says: "The first question which the surgeon asks himself in a deformity of this sort is: 'Can the intermaxillary bones be used for filling the front of the palatine cleft after the superfluous bone has been removed from the nasal septum?' Of course, if the piece of bone can be so used, the subsequent operation upon the palatine fissure will thereby be much simplified. There are, however, two fallacies in connection with the thrusting back of the intermaxillary bone: unless it be pushed well home it may exert a pressure against the line of operation in the new lip, and so obstruct prompt and complete union; secondly, when thrust into the cleft it may fail to take up a secure attachment and may prevent that narrowing of the palatine fissure which a successful operation on the lip may be expected gradually to effect."

In a case of double harelip operated by Ashhurst, [9] a small piece of cotton saturated with the compound tincture of benzoin was applied over the wound, and over this a strip of adhesive plaster, as a dressing.

C. H. Golding-Bird [2] describes an operation which has some genuine claims to originality. The objects to be attained by operation are: union of the two sides of the cleft lip; maintenance of the new lip in a horizontal line and in a manner that shall not only at the operation appear satisfactory, but stand the test of subse-

quent cicatricial contraction after many weeks; perfect adaptation of the red and white of the lip on each side, and the avoidance of any mucous membrane appearing in a vertical scar; and, finally, the restoration of the depth of the shallow side of the lip, with elevation of the flattened nostril. "In all recognized operations for harelip one or more of these conditions is undoubtedly fulfilled; but an experience on just 50 cases convinces me that rules may be laid down whereby every one of these conditions may be fulfilled by one and the same operation. The operative procedure now advocated combines the various steps that have been individually practiced by different operators; yet the steps for the restoration of depth to the shallow side, and the character, give it a novelty and a justification for its having a special designation, and I have long called it 'the rectangular operation.'"

Much attention is always given to economizing tissue, so as to close the cleft, and, the author thinks, insufficient to giving depth to the lip; the former need never give anxiety; it can always be effected; but the latter is more difficult to accomplish. To insure a successful result, the surgeon should observe the position on the edge of the upper lip, where it begins to recede from the lower when the lips are together; this rarely corresponds with the edges of the cleft. Then the shape of the cleft must be noted,—that is, the inclination of its margins and whether they are equally inclined, whether one is shallower or more receding than the other, and whether the angle of the nose is acute or obtuse. A classification, as a guide to operations, may be based on these observations of single harelip, thus: symmetrical harelip, where the sides of the cleft are equal in length and inclination, but the angle of the nose may be acute or obtuse; unsymmetrical harelip, where the sides of the cleft are unequal in length and inclination, and the shallower side is almost always, as stated above, on the outside of the notch. The symmetrical variety, with acute angle above, which is rare, can be well treated by Malgaigne's operation; the unsymmetrical and obtuse-angled symmetrical are best treated by the rectangular method. In operating, the mucous membrane of the lip, along its whole length at the alveolus (and not the *frænum* merely), must be divided in every case, and then the soft parts rapidly detached from the bones of the face, even as far up as the infra-orbital foramen, if necessary,

the depressed ala of the nose being thoroughly detached from the bone. Thus the soft parts are made to slide easily over the bone and the widest cleft can thus be closed. Then perforate the lip on its deeper side (prolabium side, generally), as near the nostril as possible and just external to the red margin, and incise downward through the entire lip-thickness till the lower angle is reached; then the knife is turned so as to cut horizontally, till it arrives over the part of the upper lip which rests on the lower lip when the mouth is closed. The distance of this part of the incision from the red margin must be determined by the amount that will be required to deepen the shallow side opposite. By a vertical cut, starting about $\frac{3}{16}$ inch from the end of this incision, the paring is detached and a square, solid flap is made. A precisely similar incision is now made on the opposite or shallow side, keeping just within the white of the lip; but at its termination over the horizontal part of the lip it is made at such a distance from the red margin that it shall correspond to the thickness of the flap. It terminates by a vertical cut, as on the other side; only it stands from the extremity of the incision.

The union of the vivified parts is mainly by means of silver-wire sutures. The lowest of the wire sutures adapts the white part of the flap, the red part and the mucous membrane on the under side being carefully united with interrupted sutures of very fine silk. The mucous-membrane sutures are very important in preventing the admission of food-particles, or the separation of the wound-edges by the child's tongue. The scar that results from this operation is much like that of Mirault or Giraldes. It is L-shaped. The dressing preferred by the author is a long strip of antiseptic gauze applied as a Louis bandage and saturated with iodoform collodion.

In double harelip, where the prolabium has to be utilized as a column for the nose, the case resolves itself into one of single harelip with a very wide cleft. But where the prolabium can be utilized in the lip, it is pared on its three sides (all the red being removed) and inserted between the apposed sides of the cleft, its lower border being united to the upper surface of the flap as the latter passes beneath it to reach the notch prepared for it on the opposite side of the lip.

The heredity of harelip is the subject of an interesting note

from E. F. Plicque, Paris,[73 Oct.25] based on the family history of a female patient who came under his observation. In this case both parents, mother and father, were entirely free from deformity. On the paternal side, however, one of the uncles of the patient had supernumerary fingers. On the maternal side an uncle was born with harelip. Notwithstanding this deformity he had two children free from defects. His sister, however, the mother of the patient in question, gave birth to nine children, five of whom were affected with harelip. In none of these five was there any palatine lesion. On the other hand, however, another sister of patient's mother, who was herself free from congenital defect, gave birth to two children, both disfigured with complicated harelip and cleft palate of the worst type. It is, furthermore, an interesting fact to notice that a brother and sister of this patient, who were born with harelip, have married, and that the five children they have had present no malformation.

Manley[1 Apr.12] also emphasizes the point that in all his cases there was either a history of heredity or maternal impression. A case of left harelip (third degree), complicated with left palate, was operated (the harelip only) on the fourth day after birth by C. Galloway.[43 June] The result was successful (chloroform used).

Goodwillie[1 Mar.29] exhibited models of 2 cases of harelip, which had occurred in a family of children in which there had been altogether four double harelips and one cleft palate. In one of the cases, that of cleft palate, a great deal of bony hypertrophy and hypertrophied tissue was thrown out, entirely filling the cleft between the hard and soft palates. This it had been necessary to remove before staphylorrhaphy could be performed. It was well, in these cases in which the vomer was absent, its place being taken by hypertrophied tissue or bone, only to leave such amount as would correspond with the vomer were it in position. Carving too much away would produce a nasal resonance of the voice.

Forgue[670 Mar.16; 1 May 24] believes that the question of age for operation should be settled by statistics. Reports by different authorities are, however, conflicting. Results are modified by numerous causes, and the operation should not be held responsible for the defective condition usually existing in the ill-formed. Death, occurring several weeks after the operation, is usually to be attributed to these unfavorable natural conditions. No rule can be

laid down for all cases; the decision must depend largely upon the character of the case. A small fissure in a strong child may be closed at once. In certain ill-nourished children the operation should be postponed till the second three months, while very complicated cases should not be attempted under the age of 2 years. It is unwise in any case to wait until the 4th or 5th year, for the parts have then become so fixed that a satisfactory result can rarely be obtained.

Cancer of Lips.—Forgue [100 Mar.25] discusses the operative treatment of cancer of the lips. The question, What are the results of surgical interference in case of cancer of the lips? is answered by presenting the well-known statistics accumulated by Worner, Maïweg, and Czerny. Worner collected, from 1843 to 1884, 866 cases of labial cancer which had been operated. Of these 28.1 per cent. recovered permanently. Maïweg in his thesis collected 182 operated at the Bonn clinic from 1866 to 1887. Of these 57 recurred and died; 44 recovered, but had not yet completed the third year after the operation; 32 have passed the third year since the operation without recurrence; 49 have already completed the sixth year since the operation and have not relapsed. Forgue concludes that cancer of the lips is radically curable, and that, as long as the carotid glands are not involved, treatment is in order.

Zielewicz, of Posen, [84 Mar.8] read a paper at the Congress of Polish Surgeons on conservative treatment of cancer of the lower lip. He speaks discouragingly of the results of surgical interference in cancerous disease, and contends that, notwithstanding the remarkable progress accomplished during the antiseptic period, the ultimate prognosis of malignant disease is practically the same as before this period. While limiting operative interference in cancer of the lower lip to the very early stages of the disease, he condemns all attempts at radical operation in the more advanced stages complicated with glandular infection. In such cases he advocates a palliative operation, and removes the neoplasm only in so much as is required by the appearance and hygienic conditions. He circumscribes the diseased area with a line of puncture made with the galvano-cautery. He then waits a few days and extirpates the circumscribed area with the galvano-caustic knife. The whole operation is performed bloodlessly; he covers the wound with iodoform gauze, and after the falling of the slough he applies

antiseptic dressings. No plastic operation is attempted to cover the defect. In the discussion following the reading of this paper, Schramm remarked that the only difference between the older methods and Zielewicz's was that the galvano-cautery was substituted for the knife, and that the patient gains thereby nothing, and, in fact, cannot be well satisfied if the saliva escapes continually from the mouth owing to the gap in the lip region that remains uncovered. Wehr spoke favorably of the galvano-cautery, as he believes with Hahn that the cancer contagium is forced into healthy tissues by operations with the knife.

Zielewicz said that he did not aim in his operation at the removal of the cancer, for he believes that that is absolutely impossible; his operation is palliative. He showed the photograph of a person operated by his method in whom nine-tenths of the lip were removed, and yet no dribbling of saliva took place. Schramm believed that cases exist illustrating the operative cure of cancer. Obalinski observed that with the present methods of operating, in which all diseased glands are removed, relapses become continually rarer. He knows of a case operated on eighteen years ago which remains free from recurrence to the present day. Dembrowski cited examples from the clinic of Wahl, of Dorpat, without relapse after ten years. The distant glands, often microscopically examined, revealed no cancerous changes.

PALATE.

In the ANNUAL for 1890 we had occasion to refer to Billroth's modification of V. Langenbeck's uranostaphylorrhaphy. Since then, Salzer, [336/Mar.29] Billroth's assistant, has published an authorized account of this operation. The favorable results of English operators, but especially the excellent functional results of J. Wolff [226/V.28] and of Kappeler, [128/'88] again directed Billroth's attention to the operation for cleft palate, and since November 21, 1888, he has frequently performed it with the aid of a simplified modification. The tension incisions (of Ferguson's method) are not adopted, but the medial plate of the processus pterygoideus is separated instead, on a level with the base of the hamular process (submucously), so that by a temporary dislocation at the point of insertion the palatine tension factors are relaxed. This technical modification has proved successful in 15 cases of cleft palate operated in Billroth's clinic.

Julius Wolff, of Berlin, [336 June 21] contributed a practical paper on "The Suture of Clefts and Defects of the Velum Palatinum Without Cutting Through the Muscles of the Palate." As is well known, in operations upon the soft palate it has heretofore been deemed of the greatest importance to provide against tension upon the parts by myotomy of the lateral palatine muscular structures. Contrary to the teachings of Dieffenbach, Ferguson, and Langenbeck, Wolff declares that the structures comprising the soft palate are the most elastic in the entire organism, and by virtue of these qualities section of the muscles may be dispensed with. He operates as follows: Incisions are made in the usual manner in the hard palate, along the alveolar border to the posterior boundary of the latter. The muco-periosteal structures of the hard palate are now carefully loosened, first from the surface of the mouth and from the edges of the cleft in the hard palate, then from the posterior edge of the horizontal portion of the bony palate and from the neighboring pyramidal processes of the latter in so far as may be required, in order to approximate properly and easily the edges of the cleft in the median line, where they are sutured in the usual manner.

Since October, 1889, less than a year, Wolff operated ten times in this manner, and with uniformly favorable results. In not a single instance did he practice section of the muscles. In these cases there occurred an improvement in the speech considerably in advance of that which follows ordinarily, and this is attributed by the author to the fact that the muscular structures were not interfered with. Even in Billroth's procedure (chiseling off of the pterygoid process) there is some interference with the muscular attachments, which, according to Wolff, may be avoided by the method herein suggested.

In the last 4 cases operated by him the palatine and alveolar halves have been united by fine sutures, not only on the anterior, but also on their posterior surface. These posterior sutures are intended especially to approximate the uppermost parts of the pharyngo-palatine arch.

Le Dentu, [31 June 5] contributes a study of uranoplasty and staphylorrhaphy based upon a personal experience of 21 cases.

The author states that for the last fifteen years he has taught that very complicated cases of harelip should not be operated on until the child has acquired sufficient resistance,—say, until

the 8th month or 2d year. In regard to the age best suited to operation on the palatine cleft, while not attempting to lay any hard and fast rules, he believes that the operation is perfectly safe after the 5th year, while at a more tender age there is decided danger. As to the technique, it is almost exclusively Trélat's.

Polaillon,[17 July 18] reports 2 cases of cleft palate in which he found it advantageous to first cocainize the palatine mucous membrane, then map out and partially detach the flaps to be dissected from the palate. In this preliminary operation the incisions made sever the deeper branches of the post-palatine arteries, which are a source of annoying hæmorrhage during the operation. Methodical compression arrests this hæmorrhage, but causes great loss of time, which is avoided in the second sitting, when mucous membrane is detached under chloroform and without hæmorrhage. Polaillon undertakes the second operation the day after the first sitting. In this connection it is well to remember that J. Wolff, of Berlin, has for some time past advocated the performance of uranoplasty in children in several sittings. Wolff's object in so doing is, however, rather to secure the nutrition of the flaps than prepare the field against hæmorrhage.

M. F. Coomes, Louisville,[224 Aug. 2] reports 2 cases of cleft in the soft palate. The respective ages were 5 and 15 years. Experience proved that cocaine was not the anæsthetic for these cases, and that the final union of the wound should not be despaired of as long as even one suture holds in place.

A case of cure of cleft of the soft palate by a double-flap operation and closure with the buried tendon suture is reported by Marcy, of Boston.[61 Oct. 26]

J. N. C. Davies-Colley, of London,[2 Oct. 26] describes a new "method of closing clefts of the hard palate by operation," and relates a case in which Dieffenbach's and the ordinary method (Langenbeck's?) had failed to effect a closure, and in which this operation was successfully resorted to. The soft palate is not touched in this operation in very young children; it is the work of another operation to complete it. In older children, over 12 years, he has had no difficulty in closing the whole gap. The author strongly recommends this procedure in (1) the cleft palate of infants; (2) in patients on whom the ordinary operation of cleft

of the hard palate has failed; (3) when the separation of the sides of the hard palate is too great to be bridged over by the ordinary operation.

In a paper based on a review of Erhman's monograph on plastic operations on the palate in infants,[1163] Adrien Pozzi, of Rheims,[55] devotes considerable attention to the phonetic results of plastic palatine operations. He believes with Erhman (whose authority is based on an experience of nearly 50 cases) that the ultimate phonetic results are mainly dependent upon the anatomical conditions which follow the operative restoration of the palatine arch. According to Erhman's experience, uranoplasty usually interferes with the complete development of the skeleton of the arch, and for this reason he believes that operations should be postponed to the period of the second dentition (the 10th or 12th year), when the palate has acquired its definitive breadth and the developmental forms have reached their maximum.

A case of undoubted primary epithelioma of the soft palate is reported by F. Cohn.[150] Judging by the literature, primary epithelioma of the soft palate is rare. The author has been able to collect only 5 cases; 3 of these are mentioned in the well-known monograph of Paget, a fourth case was described by Page, a fifth by Morris. Two specimens from cases of complicated harelip were presented to the Société Anatomique, of Paris, (1) by Erhhardt,[7] left harelip and cleft palate, involving bones and soft parts, and (2) an exactly similar case by R. Gabourand,[7] in which the disposition of the dental follicles confirmed Albrecht's theory as to the development of the premaxilla.

TONGUE.

A case of actinomycosis of the tongue, interesting on account of the manner of infection, has been reported by Maydl.[6] The patient was himself a physician, acting as a veterinary inspector at a Polish town, where he had to watch over the importation of cattle from Russia. As he had to look sometimes through hundreds of papers containing the particulars of the consignments of cattle, he became accustomed to moisten his fingers on his tongue, in order to turn over more easily the numerous sheets of paper presented to him by the cattle-drivers. After indulging in this habit for some months he observed a swelling of his tongue, which

he feared at first to be a cancer; but, taking also into consideration the fact that several cases of actinomycosis had been observed among the cattle examined by him, he believed in the possibility of an infection by the disease. The microscopical examination of the pus discharged revealed the presence of actinomycosis. The abscess was scraped out, and the patient recovered soon after the operation.

N. C. Davis, Good Thunder, Minn., [850 June] reports the case of a boy, aged 7, who accidentally cut off the tip of the tongue, it being held only by a few fibres. There was considerable hæmorrhage, which was controlled by a dilute solution of persulphate of iron. In spite of this application, good union was obtained by suturing the divided portions under chloroform. Five silk sutures were applied on the dorsal side and six on the inferior surface.

James Berry [6 May 21] showed, at the London Pathological Society, a fibro-cartilaginous tumor which he had removed from the tongue of a man aged 49 years. It had been growing slowly for five years. It was situated in the right border of the tongue, about half-way between base and tip. It had attained the size of a small hazel-nut. It projected markedly from the tongue, to which it was attached by a slightly constricted base. On the surface it was smooth and covered by mucous membrane, which moved freely upon it. Berry said the chief interest of the specimen lay in its rarity, fibro-cartilaginous tumors being very seldom found in this region. He has not been able to find any mention of a similar specimen in the Transactions of the Society. A few somewhat similar cases have been recorded by Weber, Bastian, and others, but in most of them the patient was much younger and the tumor probably congenital.

A case of primary lipoma of tongue, followed by one in the left and another in the right axilla, is reported. [77 Dec., '99] At the base of the right side of the tongue the tumor could be seen to be about the size of an English walnut, and, although usually in the pharyngeal cavity, it could be brought into the oral cavity by stretching the tongue. Its removal was accomplished, under cocaine, by means of the galvano-caustic snare.

Barker [6 Apr. 12] described in detail to the Pathological Society of London the condition of a tongue the greater part of which he had removed from a child some years ago, with complete relief,

The diagnosis has been "lymphagioma cavernosum." The condition was congenital, but had been greatly aggravated by acute and subacute attacks of glossitis occurring from time to time. There had been no recurrence since operation, and the shape of the tongue was excellent. The examination of the specimen confirmed the views of the author, viz., that macroglossia was in most cases due to lymphangiectasis alone, with but little change in the other structures of the organ.

George Fischer [301 Sept. 5, '99; 61 Feb.] describes a mixed tumor of the tongue, composed of cavernous angioma and fibroma, and which, to the best of his knowledge, has not been described before. The article is followed by a summary of the subject of lingual fibroma, with remarks on diagnosis and treatment. The opinion is expressed that such tumors cannot be extirpated with the knife, and that hermo-caustic or electrolytic treatment is the proper procedure.

A memoir on glandular tumors of the buccal mucous membrane, addressed to the Paris Surgical Society, [3 Jan. 22] elicited an instructive discussion. The tumors in question are observed principally in adult subjects varying in age from the 19th to the 60th year, and are usually situated either on a level with the veil and vault of the palate or in the inner surface of the cheeks or lips. They were long ago connected with the glands which are found in the mucous membrane of these regions. They vary in size from a lentil to a hen's egg; their surface is generally rounded, their consistence firm; the mucous membrane which covers the tumors is usually intact; the tumors are encapsulated, which greatly facilitates their enucleation. The development is slow and does not end in ulceration. These tumors were at first regarded as hypertrophied glands, but were afterward classed with the adenomas. An examination by Thaon of a specimen removed in Verneuil's service demonstrated that, microscopically, these tumors are true mixed epitheliomas, as Larabie also teaches. The microscopic structure is characterized by an important connective-tissue net-work embracing the epithelial infiltration. In the younger tumors the epithelial elements predominate; later on, the connective-tissue elements assume the ascendency, which accounts, most probably, for the relative benignity of the growths. In view of the possibilities of true carcinomatous development in these

tumors, Larabie advises not only early enucleation, but free excision of the surrounding tissues as well.

At the annual meeting of the American Laryngological Association, Roe,[99] July 2 exhibited a guillotine, made on the principle of the tonsillotome, for removing hypertrophied adenoid tissue from the dorsum of the tongue. Bosworth said that in unskillful hands there was danger of cutting of the epiglottis.

Apropos of instruments, G. M. Pease, San Francisco, Cal.,[59] Jan. 30 has invented a frænum scissors which will allow the operator to dispose of a case of tongue-tie with a single snip of the scissors.

A case of papilloma of the tongue successfully removed by electrolysis and galvano-cautery, is reported by F. S. Coverton, Toronto.[39] June 16 The papilloma occurred on dorsum of tongue, in a child aged 2½ years.

Epithelioma of Tongue and Mouth.—In the ANNUAL for 1890 we had occasion to notice the statistical studies of Roger Williams on cancer of the lip. This author now presents a valuable contribution on epithelioma of the tongue and mouth, based on an analysis of the records of 135 cases.[22] Dec. 4, '90 It is impossible to condense this work, and we will limit our notice to a few quotations:—

As regards the relative frequency of 13,824 neoplasms consecutively under treatment at Middlesex, St. Bartholomew's, St. Thomas's, and University College Hospitals, during the last sixteen to twenty-one years, 880, or 6.3 per cent., originated in the tongue and mouth; 19.2 per cent. originated in the uterus; 17.5 per cent. in the breast; 9.4 per cent. on the skin; 7.7 per cent. in the connective tissue; 5.8 per cent. in the ovary; 5.1 per cent. in the external genitals; 4 per cent. in the bones; 3.3 per cent. in the rectum; 2.9 per cent. in the maxillæ; 2.6 per cent. in the stomach; 2.6 per cent. on the lip, and 13.6 per cent. in all other parts.

The nature and distribution of the 880 neoplasms of the tongue and mouth is shown in a table, from which we glean that out of 880 tongue-neoplasms 804 were epitheliomata, 14 sarcomata, 1 myxoma, 4 adenomata, 19 papillomata, 3 fibromata, 8 angiomata, 27 cystomata. From this table it also appears that out of the whole number of cases 17 per cent. were in women.

The author then analyzes 135 cases of epithelioma consecutively under treatment at the Middlesex Hospital during the last seven years. Of these there were 122 males. The earliest age

at which the disease was *first noticed*, in 100 cases, was 25.6 years; the latest, 78.5; the mean age, 53.8 years.

Of 62 fatal cases, the total duration of life—dating from the time when the disease was first noticed—averaged 19.1 months in 33 cases that had undergone *excision*, and 18.4 months in the 29 cases for which *no operation* had been performed.

The duration of life subsequent to the excision of the primary disease in 33 fatal cases averaged 8.9 months; the longest, 39.3 months.

In studying the original seat of the disease in 100 cases, the right edge of the tongue was found to be attacked first in 20 cases; the floor of the mouth near frænum in 21 cases; left edge of the tongue, 18 cases; buccal surface of cheek, 10 cases, etc., etc.

As to the mode of origin, in 100 cases, the initial lesion is described as a small sore, crack, or ulcer in 65 cases; hard lump or nodule, 18 cases; a pimple, 5 cases.

Of 130 cases, 96 were found to be primary and 34 recurrent.

The average interval between the first operation and the first obvious occurrence in 32 of these cases was five months, the maximum fifty-two months, the minimum two weeks.

In 54 cases the primary was removed by operation as follows: Excised with knife, 16 cases, 2 deaths; with scissors, 24 cases, 2 deaths; with wire écraseur, 12 cases, 5 deaths; with actual cautery, no deaths. Total, 54 cases, 9 deaths; mortality, 16.6 per cent.

Atrophic Cancer of the Tongue.—Cerné[208 Feb.] reports a case of this nature. The patient, a woman 73 years of age, was seen just prior to death. She suffered from intense dyspnœa and dysphagia due to contraction of the isthmus of the fauces by a tumor which had invaded the right side of the velum palati. It occupied, likewise, the entire roof of the mouth, which was indurated and sclerotic, and plainly exposed upon the right side, upon which a sort of excavation had resulted from destruction of the tongue. The surface of the excavation was mammillated, superficially ulcerated, devoid of vegetations or notable secretions, and scarcely bleeding upon being touched. Upon the left side was seen the remnant of the tongue, free from ulceration, straight, slightly movable, and fissured. At the angle of the jaw was a hard and pretty large ganglion. The patient stated that the disease resulted from purulent bronchitis,

In operating on a case of epithelioma of the tongue, Verneuil,[24 Feb.9] said: "In all cases of lingual cancer, three groups of lymphatic glands must be examined: the submaxillary, at the angle of the jaw; the supra-hyoid, in the middle line of neck; the group over the carotid sheath. If the carotid group should be involved, the case must be regarded as inoperable."

The Medical Society of Victoria,[285 Oct.18] discussed 2 cases of excision of the tongue for epithelioma reported by W. Moore. In both these cases the disease was extensive, and tracheotomy was performed as a preliminary. The immediate operative results were good. R. B. Duncan also contributed "Notes on Excision of the Tongue." In both these papers a valuable consideration of the operative details is found.

Frederick Peterson,[59 Aug.30] in a note upon the disturbance of the sense of taste after amputation of the tongue, based upon the study of 2 cases in which the tongue had been completely removed for epithelioma, concludes that: 1. The perception of sourness was lost altogether, in both these cases, after extirpation of the tongue. 2. In one case bitterness was feebly perceived by the soft palate, strongly by the posterior wall of the pharynx; sweetness was not perceived at all by either the palate or pharynx, but probably by the surface of the epiglottis; the galvanic current produced no sensation of taste whatever; the olfactory sense was totally abolished. 3. In the second case, examined soon after the operation, the preceding disturbances of the sense of taste could not be determined. Besides the loss of sensibility to acids, the patient did not recognize sweets.

SURGERY OF THE TRIGEMINUS.

The year 1890 has not been as prolific as its predecessor in the introduction of new methods for the excision of the individual branches of the fifth pair. Most noteworthy is the paper of William Rose, of London,[6 Nov.1] who, on April 2, 1890, succeeded in removing the Gasserian ganglion in a case of intractable neuralgia. The patient, a lady aged 60, had suffered for years with a most acute neuralgia, first affecting the inferior division of the fifth nerve. Rose stretched the inferior dental nerve and then divided its mental branches. This gave some passing relief and he did not see the patient again until March, 1889, when, as she was suffering

from severe pain, he trephined the lower jaw and cut away a piece of the nerve-trunk. Relief again followed, but in March, 1890, her old pain had returned, the right side of the tongue being involved in addition, indicating extension of the mischief to the lingual nerve. He therefore cut down upon the inferior and lingual nerves in the pterygoid region through an incision parallel to the zygoma. He observed that he had performed this operation on several occasions at the suggestion of Victor Horsley. The operation was not very satisfactory, owing to the abundant hæmorrhage, but he felt convinced that he had divided and partially excised both nerves in this region. The result of this operation was to produce numbness on the right side of the tongue and integument of the lower jaw. Unfortunately, the pain, which had occasionally manifested itself in the upper jaw and cheek, became greatly intensified. It implicated the alveolar border of the right upper jaw and extended to the vertex of the head, showing that the superior maxillary division of the fifth nerve was involved. He then determined to remove the Gasserian ganglion, as suggested by his colleague, Ferrier, and to remove the upper maxilla at the same time, (1) because he believed there was an extensive disease of the nerves in the maxillary bone itself; (2) that the manipulations at the base of the skull would be greatly facilitated by the removal of the upper jaw; and (3) in deference to the express wish of the patient, that, whatever he did, he should remove what she called the "focus" of her suffering. Accordingly, on April 2d he proceeded to remove the upper maxilla in the usual way, and then, with a skull in front of him to serve as a guide, he inserted the pin of a half-inch trephine into the foramen ovale and removed a ring of bone, which he exhibited to the society. He then caught sight of the Gasserian ganglion lying in the petrous bone, passed an aneurism needle gently beneath it, and removed it without injuring the dura mater. The patient suffered somewhat from shock, but on the following day her condition was satisfactory. She, however, complained of heat and pain at the back of the right eyeball, which was much congested. This increased and resulted in panophthalmitis, necessitating removal of the eye. Her progress in all other respects was very satisfactory. The old pain had quite ceased and had not since returned. He thought that in future, when it was necessary to remove the ganglion, this might perhaps be accomplished with-

out removing the jaw. He extremely regretted the loss of the eye, but was disposed to consider it accidental, and not a necessary result of the operation.

M. H. Richardson[2, Feb. 3] showed a patient to the Boston Society for Medical Observation who had had successively destroyed the supra-orbital, infra-orbital at Meckel's ganglion, the buccal, inferior dental, and inferior maxillary nerves. A striking feature was the slight deformity caused by the operation. The operation was practically performed after Pancoast's method.

M. H. Richardson[2, Mar. 18] also read a paper on a dissection of the inferior maxillary nerve and the foramen ovale, illustrating a new method of dividing that nerve for neuralgia.

At the Clinical Society of London, Bland Sutton[2, Nov. 30, '90] related the details of a case in which a woman was supposed to be suffering from neuralgia and bad teeth. Subsequently a slight displacement of the eyeball was detected, and a critical examination of the patient led to the diagnosis of tumor entangling the infra-orbital nerve. The skin supplied by the palpebral, nasal, and labial branches of the nerve was anæsthetic. She suffered agonizing pain. The anterior wall of the maxilla was removed and Meckel's ganglion exposed and destroyed with the cautery. An admirable recovery resulted. On subsequent dissection the tumor was found to be a myxoma springing from the infra-orbital nerve and invading the orbit and antrum. Sutton believes this to be the first case reported of a myxoma affecting a branch of the fifth nerve and filling the antrum, and that there is strong probability that they have often occurred, but have been either overlooked or mistaken for sarcomata. The importance of a correct diagnosis is obvious, as these tumors, being benign, might be enucleated and excision of the whole bone obviated.

At the Berlin Medical Society, James Israel[4, Jan. 20] demonstrated a preparation of the superior maxillary division of the fifth nerve, removed by operation. This was performed after Thiersch's method, which consists in freely exposing the infra-orbital at the foramen of exit. The nerve is seized with a small forceps obliquely to its length and is drawn out very slowly by turning the forceps around the nerve in a central as well as a peripheral direction, in such a manner that, as the operation goes on, the nerve winds itself around the forceps. The operator succeeds by this process in

bringing out the peripheral branches of the nerve almost to its finest distribution, and the central trunk is also pulled off as far as the sphenoidal fissure. A slight facial palsy follows the removal of the second trigeminal nerve in this way, and is due, in all probability, to the simultaneous removal of anastomosing facial branches.

Weir, of New York, $\frac{9}{\text{Feb.15}}$ reports a successful resection of the inferior dental nerve by lifting the masseter off from the ramus of the lower jaw and chiseling the bone down to the inferior dental, opposite the spine.

SURGICAL MYCOSES.

By ERNEST LAPLACE, A.M., M.D.,
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SURGICAL TUBERCULOSIS.

Etiology.—The advance of bacteriological research has resulted in establishing the identity of certain diseases; thus, scrofulous glands are now known to be of a tuberculous nature, while Parietti [50 Oct. 30] and Pfeiffer [69 Nov. 22, '90] describe a form of pseudo-tuberculosis affecting the lower animals in very nearly the same manner as genuine tuberculosis, and to the naked eye presenting no appreciable difference. Wheaton [2 May 24] tells of a case, primarily one of tubercle, in which a fungus (aspergillus niger) grew in the bronchi and lung and simulated actinomycosis. The existence of muscular tuberculosis has been demonstrated by Moulé [3 June 4] in a hog. Deep in the muscular region of the thigh were gray nodules representing tubercles, which on inoculation reproduced the disease in other animals, and on microscopical examination revealed the presence of numerous bacilli of tuberculosis; likewise a case of tuberculosis in the humero-radial articulation of an ox, from which bacilli had penetrated into the medulla of the bone, transforming it into fibrous tissue.

Wohlgemuth [5 Aug.] concludes that: 1. Tubercular disease of the glands is very common in the first ten years of life. 2. The glands of the neck are involved in the majority of cases of this disease. 3. The susceptibility of boys and girls to this disease seems to be about the same. 4. The prognosis of tubercular disease of the glands in young children is generally better than in adults. 5. If tubercular disease in glands is disseminated, the prognosis is less favorable than if it is local. 6. Removal of the glands is not a dangerous operation, and should be resorted to immediately in order to destroy the focus of disease.

Treatment.—Clinical evidence has rapidly been concentrated during the past year upon the necessity of operative measures in

surgical tuberculosis. Dandois, [378 June 26] comparing this procedure with the hygienic and medical one, assures us, from numerous statistics, that its superiority is marked, inasmuch as the cure is more rapid and complete. Furthermore, the general conclusion on the value of radical surgical measures reached by the French Surgical Congress [67 Dec. 15, '89] is, that "if local tuberculosis is an accident, should it be suppressed before it becomes general?" The patient is cured, almost always, by a comparatively trifling operation. If the local tuberculosis is the expression of a general cause, this treatment still produces the best results, as by it offensive foci are destroyed, lessening the dangers of further weakening; and no real disadvantage can be brought to bear against the method.

Milton, [418 V. 8] reports 1000 cases of the extirpation of tuberculous glands, without a single case of pyæmia or septicæmia and only 2 cases of erysipelas, in both of which the infection was traced to a dresser. Of course, he admits that sometimes there is recurrence, and in several cases the old wound has been opened up again and the newly-affected glands removed. These secondary operations, owing to the manner in which the important structures are displaced and bound down, are among the most difficult. One of the best criterions of the success of this method of treatment is the ever-increasing number of patients who present themselves for operation, and who nearly all enter the hospital asking for the removal of their enlarged glands. Cazin [211 Jan. 19] says that out of 335 children treated he removed the tuberculous glands in 102. The operated cases gave a percentage of 83.34 cured and the non-operated cases 68.77 per cent.; that is, 14.56 per cent. in favor of the operation. Generalization of the disease could be found only in 1 per cent. of the cases.

Villeneuve [46 Feb.] relates a case of tuberculosis of the parotid gland successfully removed, with subsequent cure. Von Noorden, [13 July] reports 506 cases, of whom 286 were operated on and 220 underwent the medical treatment. Of the operated cases, 149 were carefully followed during three years; 93 (62.4 per cent.) have not shown the least sign of return of the affection. In the remaining 56 cases there was a return.

Of the 149 non-operated cases, 28 died in sixteen years (18 per cent.) from general tuberculosis and 14 are still alive, but have developed pulmonary tuberculosis. Thornton [22 Mar. 19] relates

that his own experience in the removal of tuberculous glands in children amounts to 200 cases during the last three years, irrespective of those he saw under the care of others. In the various modes of treating enlarged glands in their different stages, such as erosion, by poultice, iodine, paints, mercurial ointments, calcium sulphide, etc., the process was always tedious and uncertain, and the resulting scars unsightly. His operative experience led him to urge the excision of every enlarged gland after a reasonable period of medical treatment. Modified operations, such as scooping, aspiration, small punctures, were always unsatisfactory, as diseased gland-tissue was left behind. He has never met with unfavorable results, and claims that by the method of excision many months of tedious treatment were saved, the resulting scars were less unsightly, and the operation, if performed with skill and care, was generally successful.

Bronner $^{2}_{\text{Sept.20}}$ establishes the relation between disease of the pharyngeal tonsil and cervical adenitis in children. He has tested the truth of this by removing the cervical glands and leaving the adenoids untouched. The situation of this growth is highly suited to bacterial infection and propagation, which, once initiated, soon involves the lymphatic system of the head and neck. Iscovesco $^{3}_{\text{Sept.17}}$ advises the sea-shore for a short time (not longer than two months), after which tuberculous children fall back into their previous condition from loss of appetite.

Bertin and Picq $^{127}_{\text{Nov.12}}$ have undertaken the treatment of tuberculosis in man by the transfusion of the blood of the goat, which animal is known to possess immunity against tuberculosis. This step was taken after having successfully protected rabbits from tuberculosis by this procedure.

TUBERCULOUS ABSCESSES.

The iodoform treatment introduced by Verneuil has obtained the first rank in treating cold abscesses. Iodoform intoxication is not to be feared if the doses do not surpass 5 grammes (1¼ drachms) of iodoform. Barais $^{211}_{\text{Aug.24}}$ relates the experiments of Rendrick, from which it is concluded that in iodoform injections (1) this substance is gradually changed into fat; (2) in a few hours there is a separation of iodine from the fat; (3) the iodine thus liberated forms albuminous clots, which soon disappear. The most important article of the year on the subject is certainly by Billroth, $^{8}_{\text{Mar.18,20}}$ who

recommends the parenchymatous injections of iodoform emulsions. The formula used is that of Moorhof:—

℞ Iodoform pure,	. . . . .	10.0 parts.
Glycerin,	. . . . .	80.0 "
Distilled water,	. . . . .	10.0 "
Gum tragacanth,	. . . . .	0.30 "

The results of this emulsion have exceeded Billroth's most sanguine expectations, except in some abscesses originating in the vertebral column, where the treatment seemed too dangerous to be tried. The technique is as follows: Antiseptic precautions having been taken, the abscess is carefully evacuated and washed with a solution of sublimate (1 to 3000). If there is a cavity in the bone, this is energetically cleansed. The wound is next stitched up, except a large opening through which the emulsion is poured into the cavity. Sometimes healing takes place kindly without reaction. In other cases, on the contrary, great pain and high fever soon supervene, and the abscess swells to such an extent as to burst the stitches. These are then removed and a drainage-tube inserted, and the abscess treated every other day with more of the emulsion. Recovery takes place in from five to six weeks. If, after this time, no sure signs of definite recovery appear, the operation must be repeated. The worst cases of very large abscesses and fistula gave, in Billroth's hands, the best results, not merely proportionately but absolutely.

Jasinski, of Cracow, $^{6}_{\text{May 24}}$ treated 86 cases of cold abscess by means of injections through a trocar of iodoform emulsion, with encouraging results. A certain number were cured after one injection, others after two or three injections. In 11 cases the abscess broke, and an enormous quantity of pus, mixed with iodoform, was evacuated. These cases were all cured without any further surgical interference. In 19 cases an incision had to be made; the cavity was then washed out with carbolized water, iodoform emulsion injected, and the wound sewn up after inserting a drainage-tube. Though 180 grammes (5¾ ounces) of a 10-per-cent. emulsion were injected, at no time were toxic effects observed.

Bruns, of Tübingen, $^{13}_{\text{July}}$ praises the antitubercular action of iodoform. He has treated 100 cold abscesses with injections of this drug, and 80 of them were cured. Ten cases of abscess from caries of the vertebra healed up one after the other under this

treatment. The iodoform must remain for long periods in direct contact with the tuberculous material in order to effect a cure. He favors a mixture of iodoform in glycerin and olive-oil, freshly prepared and sterilized. This mixture is much to be preferred to iodoform in ether. He has had the same success in tubercular joint disease. Bauer[786 Jan.] also advises the 10-per-cent. iodoform emulsion, according to the views of Volkmann and Krause. Biot[211 Nov.24,'99] recommends the treatment of cold abscesses by elastic compression after evacuation and washing out the cavity. In a certain case he withdrew 650 grammes (20 ounces) of pus, and applied an India-rubber bandage. After three sittings the abscess-walls had reunited. A young girl having a cold abscess of the thoracic region was much improved by the same treatment.

Jasinski[109 May] reports his experience with Peruvian balsam as a remedy for coxitis and various affections of the joints due to tuberculosis. He used the drug, *per se*, slightly diluted in spirits of wine. In some cases he applied dressings soaked in the fluid; in others he injected it into tubercular cavities, repeating the injections three times a day or once every one, two, or three days, according to the necessities of the case. In others he kept the cavity constantly filled up with the balsam. The results were almost invariably brilliant, suppuration and inflammation rapidly subsiding and complete healing taking place after treatment of from a fortnight to a month's duration, The balsam also proved beneficial in tuberculous affections of the skin.

SUPPURATION.

Lannois[211 Aug.24] reports the case of a child 8 years old who contracted a general infectious adenitis from the staphylococcus pyogenes aureus. Death ensued. The blood, during life, was found to contain the above micro-organism, from which cultures were made that proved fatal to rabbits. The autopsy did not reveal any degeneration of the glands, though they were greatly hypertrophied. Bidwell[2 Feb.8] reports a case of pyæmic abscess of the sternum. The sac was the size of a large walnut; the whole of the upper two-thirds of the gladiolus and lower part of the manubrium were absent. The child was 4 weeks old. The abscess was aspirated, and an ounce (32 grammes) of foul pus evacuated. The child soon died. On post-mortem examination the umbilical vein was

found dilated and filled with pus. Both pleuræ and pericardia were adherent to the abscess-sac. The abscess had its origin in the sterno-clavicular joint and was pyæmic.

McDonald[105 Jan.1] divides the treatment of abscesses into (1) treatment by antiseptic injection without a free opening; (2) treatment by free opening and irrigation. He emphasizes the fact that, suppuration being due to micro-organisms, the treatment should be simply a battle with these germs, the principles of asepsis guiding us throughout.

Steinhaus,[69 Dec.12,'99] from a number of valuable researches, concludes that mechanical irritation alone cannot produce suppuration. The irritation must consist of a chemical which also attacks the vitality of the proliferating cells. Ptomaines, etc., are capable of producing suppuration without the presence of living organisms.

Janowski[69 Dec.12,'99] finds that turpentine produces an aseptic suppuration in dogs, and that, on the other hand, dead cultures of micrococcus prodigiosus also produced suppuration, showing that it is not always the living organism that produces the suppuration, but more especially the irritation from the chemical product or ptomaine incident to its growth. Ammonia, on the other hand, is a highly irritating substance, but does not produce suppuration. He even doubts the possibility of producing suppuration by the injection of croton-oil alone, as it does not enter into direct chemical combination with the cells of the parts.

FURUNCLES.

It has been the custom, in inflammations of the skin and of the cellular tissue, to hasten the maturity of the tumor and to give issue to the pus as soon as possible. Bacteriology has taught us that pus is produced by the streptococcus pyogenes aureus, and, this micro-organism being destroyed, suppuration should disappear; hence the direct application of antiseptics to furuncles, as originally suggested by Verneuil, in the form of a carbolic spray, to prevent suppuration or abort them. Jasiewicz[824 Feb.] gives an exhaustive theoretical as well as practical essay in support of this measure.

Leu[336 Aug.29] has used Hüter's method of injecting carbolic acid in furuncles. He first makes an incision with a lancet, and through this introduces the hypodermic syringe, and injects in all directions a carbolic-acid solution of 1.5 to 2.5 per cent. He considers the

preliminary incision essential, inasmuch as it is not painful. The average duration of the treatment has been from three to six days. The congestion and swelling disappear rapidly.

LYMPHADENOMA.

In the Paris Surgical Society, Reclus [3 Nov. 30, '99] related the case of a young man who was subject to lymphadenoma, a large mass of glands occupying both sides of the neck, from the mastoid to the clavicle, extending posteriorly beneath the trapezius muscle and causing some dyspnœa. There were no swelling in other situations, no signs of tubercle, and no leucocytosis. As extirpation was out of the question, arsenical treatment was vigorously pushed, commencing with 5 drops of Fowler's solution daily, which was increased by 2 drops every day, when injections were also made directly into the hypertrophied glands. Small abscesses were produced by the injections, but healed spontaneously, and at the end of two months, when as much as 25 drops per day were being taken, a notable diminution had taken place and the treatment was suspended. It was, however, renewed from time to time, and only two or three scarcely perceptible nodules remaining at the site of the previous tumor. He reported 2 other cases in which the result was not favorable. Although arsenic cannot be called a specific, yet it is certainly efficacious in lymphadenoma. It was the opinion of the society that lymphadenoma sometimes presents a benign form and sometimes a malignant or rapidly generalized type. J. William White [80 Apr.] describes an interesting case of a young girl afflicted with lymphadenoma, or Hodgkin's disease, having large, rounded tumors on both sides of the neck, elastic and painless. There was great anæmia, and the spleen was enlarged. The differential diagnosis of various glandular enlargement is given as a *résumé* of the article.

ACTINOMYCOSIS.

According to Ernest Partsch, [131 Mar.] the human body shows the purest form of actinomycotic infection, and is affected only through the production of a granulation tissue, which is marked by softness, a tendency to bleeding, and fatty degeneration. The accompanying suppuration is brought about not by the fungus, but by the introduction of the streptococcus pyogenes at the same time. The parasite spreads from the original focus, forming indurations which

develop into tumors, and is stopped neither by fasciæ nor bones. It never propagates itself by the lymph-channels, but by destruction of the vessel-walls easily reaches the inner organs by the blood-stream. The swelling of the lymph-glands is of a purely inflammatory nature. Actinomycosis, as such, causes no lymph-gland metastasis. It differs in this from syphilis and tuberculosis. It does not tend to a dyscrasia. It is at first a purely local affection, and its extension depends upon the entrance of the poison into the blood-vessels. It is not hereditary, and may be classed among the chronic infectious diseases. The fungus lives as a parasite on grain, and fastens upon the teeth or tonsils, or enters the lungs. As to treatment, favorable results have been obtained where thorough surgical extirpation has been possible.

Lunsnitzer, $^{2}_{\text{Jan.4}}$ at the Society of Physicians of Buda-Pesth, exhibited a case of actinomycosis in man. The patient, aged 77, had suffered from cough for two years and vomited blood for several years. In June, 1889, he presented a painful swelling in the right axillary region, which, on being opened, gave exit to serous pus. In August several small abscesses formed over the sternum, and in three or four days burst spontaneously and showed no tendency to heal. Thick infiltrations and numerous ulcers with sharp edges were noted over the chest. The sound penetrated as far as the sternal bone, the cartilages of the ribs, and into the anterior mediastinum, while it could be introduced into a cavity 10 centimetres long, extending into the axilla. A similar cavity, 8 centimetres long, was found over the fourth rib. The ulcers exuded serous pus, in which very small bodies were visible with the naked eye. On microscopical examination they proved to be actinomyces. The patient had no fever, but he coughed a great deal and actinomycetes were found in the sputum.

Fessler $^{28}_{\text{B.9,No.8}}$ enumerates the following characteristics of this disease, as observed in 2 cases:—

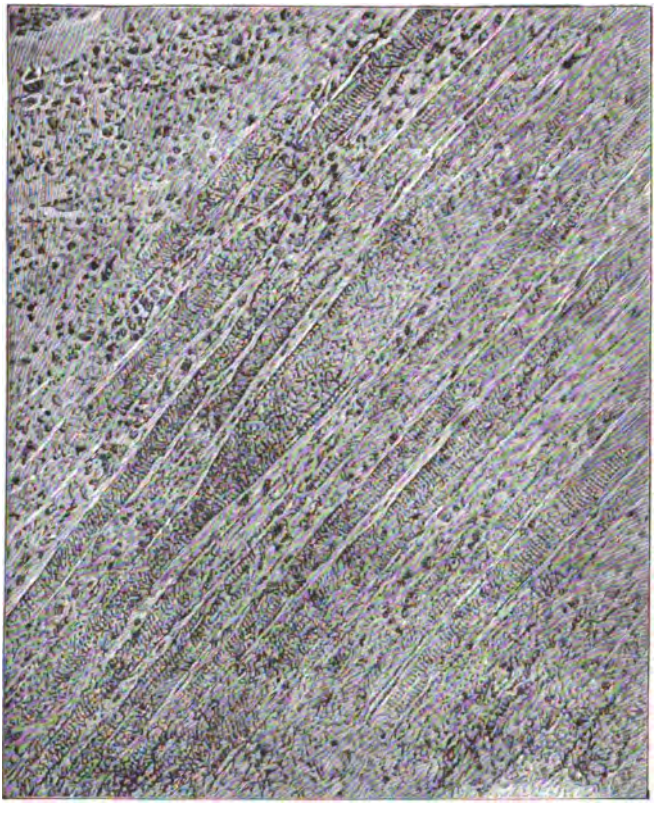
1. The course of the inflammation is sluggish and obstinate, without fever or pain. 2. There is considerable extension and induration of the inflammatory process. 3. When the disease has its seat on or in a bone, the latter and the soft parts are found closely adherent by means of thick strands. 4. Usually, in the course of weeks or months, a circumscribed special softening occurs, which discharges itself externally, without causing general

disturbing symptoms. 5. The discharge is scanty, blood-colored serum, eventually showing signs of glandular tissue. 6. Such a softened area cicatrizes quickly, the whole tumor receding somewhat, but growing again in the next few weeks. 7. Extensive destruction seems to set in late.

Albert, of Vienna, [61 Apr. 19] says that actinomycosis can no longer be considered a rare disease, and that until now, from its frequent development in the lungs, it has often been confused with tuberculosis. Matlakowski [6 July 26] reports the case of a man in whom the disease was successfully eradicated by operative measure. The infection had taken place through a cavity in one of the molar teeth. The patient was still in good health two years and a half after the operation. Baracz [8 July 10] describes 4 cases occurring in the submaxillary glands. At the St. Petersburg Congress, Kernig and Anders [22 July 23] brought forward an instructive case of supposed sarcoma, where the post-mortem revealed chronic left-sided pyelitis, retrocæcal abscess, within whose walls was found a large, brain-like mass, which could not be admitted as a new growth, but was distinct from purulent matter; it was found to be connected with a like abscess in the thoracic wall. A granular matter was found in the abscess, which proved to be the ray fungus. Von Noorden [55 July 12] gives the report of 16 cases of actinomycosis treated in Tübingen since 1883 by operative measures, with the following results: 2 deaths,—1 not cured; 1 doubtful from want of subsequent information; and 12 cases in which the cure has persisted from one to six years. There were some extreme cases among the latter. Preusse also gives encouraging results from the surgical treatment; that is, 41 cures out of 45 cases treated.

Lührs [50 Jan. 24] analyzes 21 cases treated in the Göttingen Clinic. In 13 cases the process had its origin in the teeth. In 2 cases, as the infection remained very superficial, the author supposed it to have originated directly through a wound in the skin. There were 2 cases of actinomycosis of the tongue, no doubt a carious tooth having mechanically opened the door for the local invasion. Two cases were of abdominal type, in which the cæcum was primarily infected. Finally, 2 interesting cases of skin actinomycosis, one occurring in the region of the knee and the other about the neck. Winiwarter [378 Apr. 10] presented to the Medico-Chirurgical Society of Liége the second case of actinomycosis observed in Belgium. On

the right of the spinal column the patient presented an ulcerating surface, containing very many fistulæ, from which exuded a seropurulent fluid, some fistulæ finding their outlet even in the neighborhood of the umbilicus. The affection had progressed gradually during two years. Bujwid $_{\text{Mar.21}}^{61}$ reports 7 cases observed by him in three years. The first case occurred in a young printer and his betrothed. The abscesses which had formed were incised,



MIESCHLER'S CORPUSCLES.
(*Annals of Surgery.*)

cleansed, and dressed antiseptically. Up to the present time, eighteen months after operation, there had been no return of the affection. The third case occurred in a chimney-sweep. In this case, also, the abscess was opened and scraped out, but from time to time the disease returned. The treatment should always be of a radical character. Byron $_{\text{Dec.14,'89}}^{1}$ reports a case of actinomycosis of the pleura, saying that he had also observed this disease in a

case of prevertebral abscess, treated during several years for Pott's disease.

Altogether, about 42 cases have been reported from various sources during the past year, all presenting characters which formerly would have suggested the diagnosis of some form of tuberculosis, but which, from the well known mucoid discharges and the detection of the ray fungus, leave no doubt as to the nature of the disease; so that, as Albert, of Vienna, remarks, we must conclude that this affection is of much more frequent occurrence than we have heretofore suspected.

Etiology.—Gibbes[96 Feb.] describes the presence of Mieschler's or Rainey's corpuscles in actinomycosis. "They are cylindrical, tube-like bodies, found not infrequently in the muscles of the pig, ox, sheep, and mouse. They contain a great number of small, reniform bodies, not equally scattered, but in groups. (Their size is about 0.01 millimetre.) From a careful examination the author concludes that: 1. Rainey's or Mieschler's corpuscles are produced by the growth inside a muscle-fibre of the ray fungus of actinomycosis. 2. That the kidney-shaped bodies described by Leuckart are the rays of the fungus. 3. That the granular matter in which these seem to be imbedded is the mycelium of the fungus.

Cultivation.—The ray fungus is easily cultivated upon ordinary glycerin agar, according to Hammer.[8 May 8] It grows slowly in bouillon. Should the latter become turbid from germs of putrefaction introduced with the actinomycosis, they will soon form a deposit, and none but the actinomycosis will remain floating in the bouillon. In about two months the granules will unite and form a larger mass, or actinomycosis colony. As the fungi grow older the club-shaped extremities containing spores appear.

Max Wolff[41 Mar 30] demonstrated to the Berlin Medical Society the etiology of actinomycosis. He succeeded in obtaining good cultures on agar-agar. The first stage of their growth is in rods like bacilli. These rods then become elongated into fibres. In the animal disease club-shaped masses are formed, of which excellent examples were produced. The inoculation of a culture in agar-agar into the peritoneum of the rabbit resulted in masses of the same disease, varying in size from a pea to a walnut, with typical club-shaped appearance.

ANTHRAX.

In a very interesting article Blanc[12 July] states that he finds our modern anthrax to have been the disease of the Egyptian plagues. Hamlet, on the other hand,[1000 Jan., '89] thinks that this is a matter of speculation. Thirty-six cases of infection by the anthrax bacillus have been published during the year. Four are reported by Jacobi.[114 B.17, H.5] From them beautiful cultures were obtained and are reproduced in the colored plate shown herewith.

Explanation of the Plate.—Fig. 1. Ulcer of the stomach from case 1. Coloring of bacilli according to Gram. Second stain with Bismarck brown. Numerous bacilli in the blood-vessels and especially in the neighborhood of gangrenous spots. Magnified about 250 diameters. Fig. 2. Intestine from case 1. Same stain. Fig. 3. Subcutaneous gangrenous connective tissue from the forearm; numerous degenerating bacilli. Case 2. Gram's staining. Second stain with safranin. Fig. 4. Gelatin plate culture from the original culture; forty hours ordinary temperature. Fig. 5. Gelatin plate from the original culture after it had passed through the guinea-pig; forty hours at ordinary temperature. Methyl blue.

Bouisson[288 Dec., '89] describes the rare occurrence of intestinal anthrax without cutaneous lesions, only 5 such having been previously recorded. The patient was brought to the hospital complaining of pain in the abdomen, and vomiting of food and bile. A diagnosis of intestinal obstruction was made. Collapse soon took place, there having been no time to perform laparotomy. At the autopsy attention was directed to the intestines, which were found intensely congested. One knuckle was thickened and contained a thrombus about 20 centimetres long. The intestinal glands were enormous. There were neither ulceration nor gangrene. On examination the blood was found to contain the bacilli anthracis in great numbers.

The clinical diagnosis is always a difficult one, the case presenting symptoms of poisoning or of intestinal obstruction. The occupation of the patient may sometimes give a clue to the true nature of the case. When no malignant pustule exists, the bacillus finds its entrance through the alimentary or respiratory tract.

Woodhead and Cartwright Wood[8 Dec. 25, '89] show the antagonistic action of the bacillus anthracis and the bacillus pyoceaneus in the guinea-pig. The animals which were treated or protected by the *pyoceaneus* remained alive after being inoculated with anthrax. Arloing gives the following conclusions as to the loss of virulence in cultures of the bacillus anthracis: 1. In a given culture all

FIG. 2.

FIG. 3.

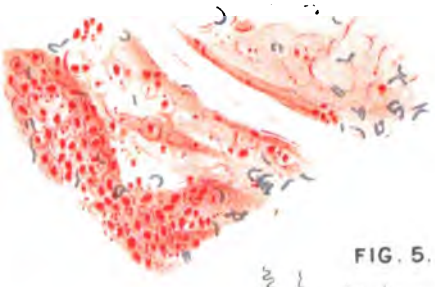
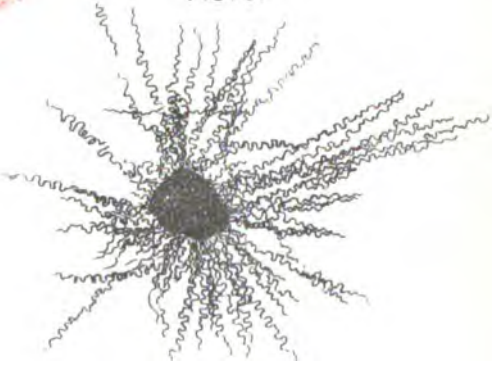


FIG. 4.

FIG. 5.



Cultures of the Anthrax Bacillus (Jacoby).

Zeitschrift für Klinische Medicin.

Buck & McFetridge Lith Phila

the bacilli do not possess the same virulence or the same growing power. 2. Age is felt first by the weakest bacilli; hence a culture soon becomes less virulent if abandoned to itself. 3. Fresh cultures must be constantly made to obtain crops of virulent bacilli.

E. Roux $\frac{262}{V.4.No.1}$ has found that by cultivating anthrax in calf-bouillon to which phenol is added, he obtains a variety of the organism which does not subsequently form spores under any circumstances. The bacilli are just as virulent as those which have not lost their power. The amount of phenol used is about 6 to 10,000. Access of air prevents their losing spore-building power.

Treatment.—Apostoli and Laquerière $\frac{3}{Apr.20}$ announce, as a result of their researches, that the continued current in medical doses (say, 50 to 3000 milliampères) has no particular action upon germ cultures in a homogeneous medium, and that microbes are killed only by the acids set free near the positive pole.

Lande describes 2 cases of malignant anthrax cured by the subcutaneous injection of carbolic acid into the tissues around the anthrax pustule. The strongest solution used when the symptoms were severe consisted of 15 grammes (4¼ drachms) of neutral glycerin and an equal part of distilled water, in which 3 grammes (¾ drachm) of crystals of carbolic acid were dissolved. The injections made at five different points around the anthrax represented 50 centigrammes (7½ grains) of pure carbolic acid. The solution caused intense pain, but rapid improvement of the symptoms. This 10-per-cent. solution was stronger than any previously employed for the same purpose by Boeckel, Raimbert, and others. Nevertheless, it does not appear to have caused sloughing of the tissues. A 5-per-cent. solution is strong enough, in the opinion of Lande, except in very severe cases where the patient feels little pain. The injections must be repeated until the bad symptoms cease to recur, which may be within forty-eight hours.

Voskresensky, of Ardatov, $\frac{25}{Oct.}$ highly eulogizes the treatment of malignant pustule by large doses of carbolic acid. In the course of the last four years he used this method in 16 consecutive cases of a severe type. Notwithstanding that some patients presented themselves as late as the seventh day, the treatment was successful in every case. The drug was employed both internally and externally. Externally, a 2½-per-cent. solution—about 6 drachms (24 grammes)—of it was injected around the pustule and apparently

healthy zone, a 5- or 6-per-cent. solution around the margin of the lesion, and a 50-per-cent. deep into the middle of the pustule. On an average, 12 grains (0.78 gramme) of carbolic acid were introduced subcutaneously within ten minutes. In 10 cases the injections were repeated on the next or third day; in the remaining 6 any remaining injections proved superfluous. Internally, a solution of 4 to 8 grains (0.25 to 0.52 gramme) of the acid in 6 or 8 ounces (192 or 256 grammes) of peppermint-water; a tablespoonful every two or three hours for three days was given, an average individual dose being ½ grain (0.03 gramme), a daily dose 8 grains (0.52 gramme). All general symptoms—headaches, giddiness, etc.—disappeared after the first doses. Within one to three days the pustule was transformed into a benign abscess, all swelling simultaneously melting away without any unpleasant effect.

Arnoldoff[697 Aug.] successfully treats anthrax by deep injections of mercury and carbolic acid, according to the following formula:—

℞ Hydrarg. bichloridi, ... gr. ij (0.13 gramme).
Solution acid. carbol. (5 per cent.), . ℥j (32.00 grammes).
Sig.: Inject two syringefuls into the swelling once or twice a day.

The diseased region is disinfected by a 1-to-2000 solution of corrosive sublimate, and kept covered with a corrosive-sublimate gauze or compress soaked in a carbolic solution.

Barkoff[25 Apr.] warmly recommends the following plan of treatment: Having made a free crucial incision into the pustule, he cauterizes the wound with pure crystallized carbolic acid, and subsequently covers the part with a thick layer of gray mercurial ointment. He also orders the patient to make inunctions with the same salve around the pustule, repeating them three times a day. The daily dose of ointment should be less than 1 ounce (32 grammes). In addition he prescribes carbolic acid internally:—

℞ Acidi carbolici, ... gr. vj (0.40 gramme).
Aquæ destill., ... ʒiv (16.00 grammes).
Syrupi simpl., ... ʒss (2.00 grammes).
Sig.: A tablespoonful five times a day. Chlorate of potassium is added to prevent stomatitis.

Milot-Carpentief also reports a case cured by the subcutaneous injection of sublimate solution, 1 to 4000. The pustule existed on the finger. Six injections were made and the treatment kept up eight days. Besides, a poultice of sublimate was constantly kept on the parts. The cicatrization was complete in fifteen days.

SURGICAL DISEASES.

By LOUIS McLANE TIFFANY, A.M., M.D.,
AND
RIDGELY B. WARFIELD, M.D.,
BALTIMORE.

HYDROPHOBIA.

ALTHOUGH hydrophobia continues to excite the scientific interest of the whole world, and although it is constantly made the subject of careful research by the most capable observers, we cannot record for the last twelve months much distinct advance in our knowledge of the disease.

In recent literature the subject has been considered from every stand-point, and independent investigations have been made in every part of the globe. Still, as every point advanced is followed by rapid denial, it is difficult for the reviewer to properly measure the importance of existing evidence, and to bring any sort of order out of such chaos. The disease remains most perplexing. This much, however, seems established: that, although up to this time the germ of hydrophobia has not been discovered, it can no longer be doubted that the disease is a microbic one. As expressed by Senn[1081, p.406]: "At the present time we can safely assert, without fear of contradiction, that the essential cause of this disease is a specific virus, which can only be reproduced within the living organism. As a small quantity of this virus introduced into the tissues can result in the most serious consequences, there exists no doubt that it possesses the properties pertaining to living organisms, more especially the capacity of reproduction after its entrance into the body. That the disease is not caused by preformed ptomaines communicated from the saliva of rabid animals is shown by the variable and, on the whole, long stage of incubation which precedes all true infective processes. Another convincing proof of its microbic origin is the well-established fact that the disease can be artificially produced by implanting fragments of brain- or cord-

tissue, taken from animals dead of rabies, into healthy animals." Senn also expresses the opinion that since, clinically and pathologically, the disease so strongly resembles tetanus, its microbe probably possesses analogous pathogenic properties to the bacillus of that disease, and that the actual development of hydrophobia follows the action of the germ-produced ptomaines on the central nervous system.

Concerning the value of preventive inoculations in hydrophobia, as practiced by Pasteur and his followers, all shades of opinion are expressed, from the most enthusiastic acceptance of the theory to grave doubt or even positive denial of its efficiency. The statistics from the Pasteur Institutes indicate, apparently beyond reasonable question, that many lives are annually saved by means of the antirabic injections; while from other sources evidence is not wanting to show that the death-rate by their use is in no way lessened, or even that "rabies increases *pari passu* with the erection of institutes intended to prevent it."

One of the advocates of the injection theory, Buchanan,[213 Jan.] in an address before the University Medico-Chirurgical Society in Glasgow, reviews the subject of hydrophobia, and describes in detail the methods of treatment employed in the Pasteur Institute in Paris. He quotes from the report of the well-known committee appointed by the English government to investigate the subject, ending with the statement that the inoculations practiced by Pasteur on persons bitten by rabid animals have prevented the occurrence of hydrophobia in a large proportion of those who, if they had not been so inoculated, would have died of that disease. He further says: "From such conclusions, formed by such a committee after the most careful investigation, it is impossible to escape, and their verdict must be accepted without reservation."

Buchanan is also an advocate for muzzling dogs, believing that in this way, by proper legislative interference, the disease may be effectively stamped out. This point, which year by year attracts considerable attention, is still quite unsettled. The fact, however, remains that in countries where muzzling is generally enforced rabies is practically absent.

Some interesting points were brought out in a discussion on hydrophobia at the New York Academy of Medicine in October.[1 Nov.] L. C. Gray raised the old question as to the very existence of such

a disease, saying that the extreme variability of the period of incubation and the many cases of reported hydrophobia proved to be spurious lent credence to such unbelief. He thought that the so-called dumb rabies was only a symptom of some form of meningitis, and that, at most, but very few cases of the real disorder had been observed in New York or the country at large. He further said that, although such a belief had been considered childish, it was a clinical fact that great psychical shock could produce mental disease and death.

C. L. Dana expressed the opinion that the scientific work of Pasteur, confirmed by many other investigators, had established experimentally the fact that rabies was a specific disease, and that the hydrophobia of man was identical with rabies in the lower animals. These points had been further proven by etiological, clinical, and anatomical investigations. As to the question, Could the immunity to rabies, which it was known could be conferred upon dogs, be conferred upon man? there was, in the author's opinion, "no experimental method, no pathological fact, and no prophylactic measure more firmly established than that anti-rabic inoculations could be successfully applied to man." That much is still to be learned about rabies is clearly shown from the fact that approximately the same results may be obtained by the vastly different methods of injection employed by Pasteur, Ferran, and others. The author does not accept the statistics of Pasteur as to the relative mortality after the inoculations, but he thinks it shown that by Pasteur's method some immunity can be conferred on rabbits and probably also on human beings.

H. C. Ernst, of Boston, in the same meeting, said that he regarded the results accomplished by Pasteur as among the greatest achievements of modern medicine. Once a doubter, he had, after a series of inoculation experiments, become converted to a thorough acceptance of the injection theory. There was nothing more certain in medicine than the unerring precision in the results obtained by the inoculation of the cord emulsions under the dura of healthy rabbits. Although a constant pathognomonic lesion for rabies had not been proven, the very uniform white-cell infiltration of the minute vessel-walls in the medulla, the engorgement of the veins, and the occasional circumvascular hæmorrhages were most suggestive.

Gray thought that the discussion in this meeting had gone far toward proving (1) that there undoubtedly existed in the lower animals a disease known as rabies, possibly made up of several diseases, due to different micro-organisms; (2) that this disease was more frequent in the lower animals than a similar disease in man known as hydrophobia; (3) that, while this so-called rabies in animals occurred very often in this country, it occurred less frequently in the human being; (4) that very few medical men had seen genuine cases of hydrophobia; (5) that cases of pseudo-hydrophobia were by no means uncommon, and that death could result from the condition; and (6) that there still existed considerable diversity of opinion as to the value of Pasteur's method, which would furnish material for discussion and incite to further experiment.

In this country much attention has been directed to the new Pasteur Institute in New York, established early in the year as a branch of the Paris institution, and put under the care of Paul Gibier. 59 760 Oct. 4; Oct. 11

We gather from his report that during the first eight months in the history of this institution 610 persons had applied for relief at his hands, coming from widely different parts of the United States. Of this number only 130 were put under treatment, it having been shown in the rest that the attacking animals had not been mad. At the time of the report all of those to whom the antihydrophobic treatment was given were enjoying good health. Those only remained for treatment who had received wounds from animals proven to have hydrophobia by veterinary examinations, by inoculation in the laboratory, or by the death of some other persons or animals bitten by the same dogs.

To the insinuation that preventive inoculations may themselves be capable of conferring rabies Gibier gives an emphatic denial. He says, in substance, that 10,000 people have been inoculated in Paris, and that of this number about 50 (1 to 200) have died, notwithstanding the treatment. From the bulbar nerve-matter of these individuals repeated inoculations into rabbits have been made, with the effect of causing death in from eighteen to twenty days, exactly as happens when virus is taken from the common mad dog. Now, if they died from the preventive inoculations, the intra-cranial insertions would have killed the rabbits in a period

ranging from nine to eleven days, as always occurs when the powerful virus employed at the end of treatment is used. "These people, therefore, were not killed by the virus of injection, but by that of the animals that had bitten them."

He cites, as another proof that Pasteur's inoculated patients did not die from the treatment, that the five people who died after the injections by Bareggi, of Milan, who followed the method of Ferran, presented symptoms differing altogether from those observed in Pasteur's patients.

In the discussion on Gibier's paper before the last Congress in Berlin, the efficacy of the treatment was unanimously conceded, and it was only upon details and certain modifications connected with the method of inoculation that the subject received comment. Among several interesting observations recorded at that time was the following by Babes: "In the environs of Bucharest a mad wolf bit 13 people and 30 domestic animals (oxen, horses, pigs, and dogs). The 30 animals died of rabies; 1 of the men, who had neglected to have himself inoculated, acquired hydrophobia and died also. Another man died from the traumatism inflicted by the wolf, but the other 11 people, who received inoculations in the Pasteur Institute of Bucharest, are now, after two years, in excellent health. Some recently-published comments[19] on the results obtained under Gibier's treatment, although depending largely on newspaper reports for their collection, seem to modify to some extent his published statements. In fact, argument against the Pasteur theory does not seem, in any way, to diminish. We had, on the authority of the well-known Peter,[21] that, so far from being lessened, the number of deaths from hydrophobia in France has actually increased since the establishment of the Paris Institute. In the same line, Dujardin-Beaumetz[24] records, in his report to the Prefect of Police, that for the year 1889, in the Department of the Seine, 6 deaths occurred from hydrophobia, 3 in persons who had undergone treatment in the Pasteur Institute and the other 3 in those who had received no treatment whatever. He maintains that Pasteur's inoculations do not prevent the disease, and insists, as of more importance, on the rigid enforcement of the law in reference to stray dogs.

A careful histological examination of the central nervous system of a man dead of hydrophobia has been recently made by

Popow, of Warsaw. 530 Nov. 4 He found in the nerve-fibres, especially in the cord, a series of varicose inflations, due apparently in the early stages to an unequal swelling of the myeline substance, the axis-cylinder remaining intact, while later the enlargement seemed to result from hypertrophy of the cylinder itself. The cells were found generally affected in both protoplasm and nucleus. In the protoplasm granules of yellowish-brown pigment were found, either collected in masses toward the poles or around the nucleus of the cell. In some cases the whole cell seemed filled with pigment, and was rounded and irregular, losing its normal characteristics. The change in the nucleus was of a similar kind. Those affected were of irregular shape and granular. In some instances the nucleus had entirely disappeared, leaving only its nucleolus surrounded by irregularly-scattered granules.

The cellular changes were most marked in the anterior horns of the lumbar and cervical regions of the cord, in the motor nuclei of the medulla, in the posterior limbs of the corpora quadrigeminus, and in the frontal and para-central lobes of the brain. The enlargement of the intercellular spaces, first pointed out by Schaffer, was apparently not present in this case. Popow agrees with Schaffer that the lesions are of an inflammatory nature. He thinks, also, that the hydrophobic virus attacks by preference the motor centres of the brain and cord.

Richard Mollenhauer, 242 Sept. in a paper read before the American Neurological Association, in June, exhibited some microscopic specimens of a germ taken from a dog which he had succeeded in rendering rabid by inoculation. The germ was a bacillus whose various growth-stages were of a uniform type. "In its adult period it was usually found in chains typically made up of four, rarely of three, somewhat more frequently of two, and exceptionally of five links." He notes the fact of the great difference between cerebral and hypodermatic inoculations with the same material. In his own experiments aseptic cerebral inoculations with the specific material always killed in a period of from six and a half to nine and a half days, while the same substance used subcutaneously was usually without result. He thinks it probable that the manifestations of rabies in the dog may be symptoms of various diseases, and, further, that the bacillus he describes may, at least, produce a disease clinically undistinguishable from the rabies

of veterinarians. The germ in question he has found swarming in the parotid glands of rabid animals, whence the probable infection through a bite is obvious.

Two Italian observers, Blasi and Travali, have recently made a number of experiments as to the effect of various chemical substances on the poison of rabies. They subjected pieces of the virulent spinal cords of animals, dead from the disease, to different drugs in solution, or, if it were insoluble to the drug itself, in powder. Subsequently, the cords so treated were broken down into emulsions and injected into the peritoneal cavities of guinea-pigs. In this way they determined that the rabic poison was extremely sensitive to the action of caustic and antiseptic substances. In the order of efficacy, they place creolin and citric acid first, and afterward solid nitrate of silver, sulphate of copper, salicylic acid, hydrochloric acid, and perchloride of iron. Other agents, such as sulphate of zinc, permanganate of potash, iodoform, ammonia, sulphuric acid, camphor, and boracic acid, proved less powerful.

Up to this time it has been generally believed that an animal could not transmit the poison of rabies to another animal, or to man, until it had itself developed positive symptoms of the disease. Roux and Nocard, [2/2 Mar.] in Pasteur's laboratory, have recently attempted by experiment to determine the earliest time when such infection is possible. They give, as the result of their work, the rather startling information that infection is possible from an apparently sound animal as much as three days before symptoms of the disease appear. That hydrophobia may develop from the bite or even the caress of an animal in the best of health and with the best of tempers is an uncomfortable and important addition to our knowledge of the disease.

Lucas Benham, [6 Mar. 1 to 15] in a series of articles, reviews carefully 50 cases of supposed hydrophobia which have been recorded from time to time as having ended in recovery.

In the treatment of these cases vigorous bleedings and the use of mercury to salivation held first place, although the narcotics generally and vapor and cold-water baths were also employed. Many of the cases were reported early in the century, and the accuracy of the diagnosis is, to say the least, questionable. While it is, of course, desirable to combat this formidable disease by all means in our power, we think it more than doubtful that a cure

has ever followed a genuine case of hydrophobia in man when once fairly developed.

TETANUS.

Although doubt still exists as to whether one single germ is invariably the actual cause of tetanus, and the exact nature of the disease cannot yet be considered as positively known, its infectious character is now conclusively settled. The results accomplished in the last few years have established beyond reasonable contradiction not only the fact that the disease may be produced by inoculations into animals of pure cultures of the germ of tetanus, but that tetanus is clearly a microbic disease, with the bacillus of Nicolaier and Rosenbach as its essential cause. Indeed, the most important problems remaining now to be solved seem rather to refer to the chemical products of the bacillus and the processes by which, after infection, the disease becomes manifest in the organism. Besides this, more light is especially needed on the important subjects of prophylaxis and treatment in this formidable disease.

Since Nicolaier, in 1884, found in superficial soil the pin- or brush-shaped bacillus which now bears his name, and by subsequent inoculations produced tetanus in animals, and Rosenbach, a few months later, obtained a like germ from the wound-secretion of a patient with tetanus, the chain of evidence as to the real nature of the disease has been gradually formed, the last essential links being added from Koch's laboratory by the Japanese student, Kitasato.[1082 Pt.2,p.162] To this brilliant observer all credit is due, since he not only first isolated the germ and by inoculation with pure cultures produced the disease in animals, but also established the identity of the soil bacillus with that obtained by Rosenbach from the wound of a patient with tetanus. The method by which Kitasato obtained pure cultures of the germ has already become classical. By this and by other methods different observers have since accomplished the same end. According to Kitasato, the tetanus bacilli produce spores in thirty hours in cultures kept at a temperature of the body. At this time the bacillus is swollen and usually bulged at one end by the contained spore. When not bearing spores the bacillus is a straight, stiff rod of varying length and with rounded ends. The spore itself is not obviously peculiar; it stains badly or not at all, and is small and round, or oval.

The germ of tetanus is strongly anaërobic,—a fact which ex-

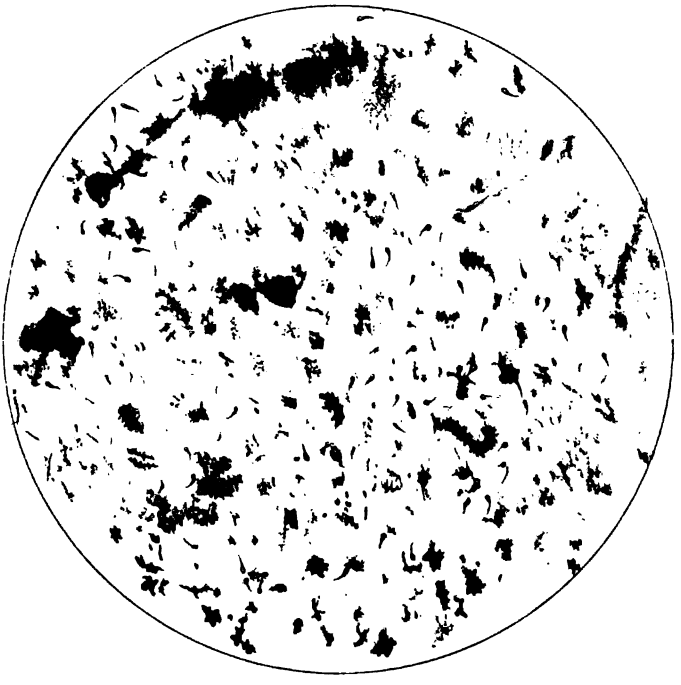
plains many of the failures of its attempted cultivation. It lives through a wide range of temperature, resisting well both heat and cold. Its spores remain alive after exposure, from half an hour to to an hour, to a temperature of 80° C. (176° F.). They are destroyed after five minutes' stay in a sterilizer at 100° C. (212° F.).

Besides elaborating and fixing points already gained, the work of the past year has been marked by some real advance in our knowledge of tetanus. One of the most interesting articles presented is that of Theo. Kitt, $\frac{50}{\text{Feb. 28}}$ of Munich. He accepts the pure cultures of the germ obtained by Kitasato, and independently by Bucher, as making complete the doctrine concerning the etiology of the disease, and describes in detail his own experiments on the effect of pure cultures of the tetanus bacillus on horses, sheep, and dogs. A portion of the dried pus obtained from an abscess in the hoof of a horse which had died of tetanus was ten times diluted with sterilized water, and 2 cubic centimetres (32½ minims) injected subcutaneously into the neck of a horse. From September 21st to October 9th the horse remained apparently well; then symptoms of tetanus came on, the animal grew rapidly worse, and died at midnight October 10th. The symptoms were those of tetanus in horses, notably the peculiar facial expression of horses with locked-jaw and the dilation of the nostrils. Still, as the horse was old and worn out, and the disease ran such an acute course, it was necessary to have more proof that it had succumbed to inoculation tetanus and to nothing else. The autopsy done on October 11th furnished this proof.

No special organic lesions were found, but from the area of diffuse redness under the point of inoculation some liquid was scraped with an aseptic knife, and 9 white mice were each inoculated in the subcutaneous tissue of the hips with an amount of the material varying from ⅛ to ¼ grain (0.0081 to 0.016 gramme). All had tetanus by the 14th, and all died,—2 on the 15th, 5 on the 16th, and 2 on the 18th. Other mice, inoculated with blood from the heart and œdema liquid from the pharynx, remained healthy. He did not find the characteristic germ with terminal spores either in the juices at the point of inoculation or in the pus from the hoof of the first horse. The pus contained masses of cocci and single bacilli of the shape of the sporeless form of the tetanus germ. In the mice, however, he found several times the pin-shaped bacillus partly provided with spores. Kitt had tried without definite suc-

cess many culture experiments with different media; but, finally, when Buchner's method of cultivating anaërobic fungi became known, these were repeated, and he succeeded in obtaining mixed cultures in blood-serum of material taken from points in mice inoculated with dried pus from a horse. These were virulent to the third generation. Finally, "by extreme dilution with sterilized water, and with linear inoculations in blood-serum from the horse and sheep," he obtained pure cultures without the aid of the heating process. The morphology and growth of the tetanus bacillus occurring in the horse agree, on the whole, with Kitasato's description of that in human or soil tetanus. Kitasato's cultures in blood-serum were not liquefied. The tetanus bacillus of the horse, as well as those from the pure cultures from the soil, effected in Kitt's hands uniform alteration in the blood-serum accompanied by partial liquefaction. The serum cultures were found to be very virulent. Kitt inoculated a horse and 2 dogs, all of which died rapidly of tetanus. Later, 2 sheep were inoculated with diluted virus and typical tetanus produced in each case. Three doves were tried, and 2, having the virus applied to denuded surfaces, remained alive; the other, inoculated with $\frac{1}{8}$ cubic centimetre (2 minims) in the pectoral muscles, died in two days, tetanic. Kitt concludes that tetanus of the horse is caused by bacilli which resemble the bacilli of human tetanus and soil tetanus described by Nicolaier, Kitasato, Buchner, and others; that it is possible to obtain pure cultures without heating when the primary material is not too seriously contaminated with other bacteria, and Buchner's method of cultivating anaërobes is employed; further, that dried pus which contains spore-bearing tetanus bacilli retains its virulence from four to sixteen months, and at first seems to be a transfer of pure cultures to the horse, sheep, and dog, resulting in a typical attack of tetanus.

Paul B. Bossano,[46] whose work in the examination of various soils for the presence of the Nicolaier germ had already attracted attention, has produced an elaborate article on "Experimental Researches on the Nature of Tetanus." He divides the history of such research into three epochs: 1. The work of Nicolaier's predecessors as to the possibility of the transmission of tetanus from man to animal or from animal to animal. 2. That of Nicolaier and his successors proving the existence of the tetanic



Tetanus bacillus (Nicolaier).
Journal de Médecine de Bruxelles

Bach & McFetridge, Lith. Phila.

germ in the soil, and the possibility of producing tetanus by earth or wound inoculations. 3. The discovery of the means of isolating the germ by Kitasato, "which has negatived, for the most part, serious arguments against the theory of the infectious nature of tetanus." Continuing his inoculation experiments with the soil of different countries, he has obtained interesting results. He secured soil from forty-three different countries from many parts of the world, and inoculated 96 animals with different specimens, some, of course, from the same country. The earth of twenty-seven countries gave positive results. Thirty-nine animals died tetanic and 16 others succumbed during the course of the inoculations, 9 without definite symptoms and 7 with symptoms more or less tetanic, but with the disease not positively marked. N. W. Petroff, [571] No. 21, '90 after failing with the method of Buchner to obtain in the pus from a patient with tetanus pure cultures of the germ, afterward succeeded, by means of heat, in securing an uncontaminated culture; this, injected into mice, produced characteristic tetanus.

Widenmann [118] Dec., '90 reports a case of tetanus in a child following a wound in the cheek as the result of a fall on ground covered with horse-manure. On the sixth day after the accident a splinter was withdrawn from the wound. Six days later tetanus developed, with death on the fourth day. The author inoculated mice and rabbits with splinters of wood taken from the wound, and with soil taken from the place where the fall occurred. In each case he obtained typical experimental tetanus.

Pla, of Havana, [459] p. 71, 187 says that among 4323 children born in 1889, 343 died of tetanus. This enormous mortality he thinks due to the use of water from the river Zanja as a dressing to the umbilical wound. The river in question flows through a richly-cultivated country and conveys quantities of drainage from certain quarters.

Verhoogen and Baert, [276] Feb. 20 to Apr. 20; May 20 to July 20 in the Laboratory of Physiology at the University of Brussels, have carefully considered experimentally the whole subject of the nature and etiology of tetanus and give the following conclusions: 1. Tetanus is a specific infectious disease. 2. Outside of the diseased organism the specific germ may develop in the soil. 3. In addition, it may exist at different points,—on the coats of horses or other animals, in the dust of hay, on surgeons' instruments, etc. 4. These different

situations (soil, dust, horse, and man) constitute a closed cycle, from any element of which the bacillus may constantly or indefinitely emigrate, so that it is not possible to designate the point of initial departure. 5. The horse plays, in this transmission, no greater rôle than cattle in the propagation of tuberculosis.

The observations of Sormani $_{\text{No.28,'90}}^{589}$ on the action of the gastric and intestinal secretions on the bacillus of tetanus deserve mention. He caused herbivorous and carnivorous animals to swallow pure cultures of the bacillus and also fed dogs and rats with the flesh of animals that had died of tetanus. In some of these experiments the gastric juice was allowed to remain normally acid; in others it was neutralized by carbonate of soda. His conclusions are: 1. The flesh of animals that have died of tetanus can be eaten with impunity. 2. The microbe of tetanus can pass through the alimentary canal of herbivorous and carnivorous animals without causing any symptoms. 3. The digestive secretions of these animals neither kill or alter in any way the bacillus of tetanus. 4. An animal can introduce into its stomach with impunity a dose of tetanic virus two thousand times greater than that which is sufficient to kill if injected subcutaneously. 5. These facts throw some doubt on the theory that the symptoms of tetanus are due to the absorption of poisonous alkaloids secreted by the bacillus. 6. The fæces of animals may be a not insignificant agent in the distribution of the tetanic poison.

Sanchez, Toledo, and Veillon, $_{\text{Oct.15}}^{8}$ in a recent article, confirm Sormani's statements, and note the presence of the bacillus in the excrements of perfectly sound horses and cattle. The spores of the germ, like those of Pasteur's "vibrion septique," resist the action of the intestinal secretions, and re-appear in the fæces with all their virulence. In the line of attempting to secure immunity toward the action of the tetanic poison, by chemical inoculations of vegetable substances, the recent observations of Peyraud $_{\text{Aug.2,'10}}^{188}$ are interesting. This investigator obtained a virulent material from soil taken from a wine-cellar, where horses had never been, and which had never, in any way, been cultivated. From this substance tetanus was produced by every inoculation, 5 animals out of every 6 dying of the disease. Later, acting on the theory that strychnine produces many symptoms similar to tetanus, Peyraud undertook a series of experiments to determine whether an animal,

protected by strychnine, could resist at all the tetanic poison. Ten rabbits were each, once daily for five days, inoculated with the drug in solution. Enough strychnine was used to produce distinct symptoms. These inoculations from the wound-tissue of an animal with experimental tetanus (from the cellar-dirt) were made, and the wounds carefully closed. Four test rabbits and 3 of those protected with strychnine died. In a second series, with tetanic virus from another locality, 7 prepared rabbits and 14 test rabbits were inoculated six days after the strychnine injection had been stopped; 13 of the test rabbits and 4 prepared animals died. Further inoculations of tetanic earth were made later on in rabbits prepared at the Laboratory of Physiology of the Faculty of Medicine. The following result is reported by Denucé [188 Aug.17]: the mortality in the prepared animals amounted to only 22.5 per cent., while of those not protected 80 per cent. died. Denucé considers that the obtained results "show that strychnia vaccinations give to animals a considerable resistance against the virus of tetanus, and offer strong argument in favor of the theory of protective inoculations advanced by Peyraud." A committee appointed to investigate Peyraud's work could not substantiate the results obtained by that observer. According to Nocard, [3 Oct.8] the reporter, in their hands, 0.6 of a milligramme ($\frac{3}{320}$ grain) of strychnia sulphate, injected daily for five days, did not protect a single one of 8 rabbits against the action of a pure cultivation of the bacillus of tetanus. They were killed as rapidly and with the same symptoms as 8 test rabbits. All died in from three to five days. Finally, thinking that the dose of strychnine might be too small, they tried 10 more rabbits, killing 2 with the strychnine. On the sixth day the 8 prepared rabbits and 4 test rabbits received 10 drops of a pure culture of the bacillus, with the result that the whole 12 were dead in five days. They consider that the most important feature of Peyraud's work was the demonstration by him of the presence of the Nicolaier bacillus in non-cultivated and undisturbed soil.

Positive advance toward the production of immunity against tetanus seems very recently to have been made by researches in Koch's laboratory by Behring and Kitasato. [69 p.1112] These two observers have been engaged for some time in a study of the nature of diphtheria and tetanus, and they have at length succeeded in not only conferring immunity in animals against attacks of either

disease, but also in arresting the disease after it has already set in. They have succeeded in giving animals complete immunity against tetanus, both against the living organism and the produced poison. The manner in which such immunity is produced has not yet been explained, but without ill effects rabbits have been made to withstand twenty times the dose of the tetanus poison sufficient to kill test animals. The blood of a rabbit so protected, which had withstood the inoculation of tetanus, was found to confer, in turn, immunity to mice when injected into the peritoneal cavity, and followed after twenty-four hours by inoculations of virulent cultures. The importance of this discovery can scarcely be overestimated, and, although the method of obtaining such startling results has not been published, the following proposition is presumably correct: "The immunity which can be conferred on rabbits and mice against tetanus depends on the power possessed by the serum of the blood to render innocuous the poisonous products formed by the tetanus bacilli." Behring and Kitasato sum up their results as follows: 1. The blood of rabbits rendered immune against tetanus possesses bacteria-killing properties toward the tetanus bacillus. 2. These properties belong also to extra-vascular blood and to the serum obtainable from rich blood. 3. These properties are of such a durable nature that they remain active even in the bodies of other animals; so that it is possible to obtain good therapeutic results by the operation of serum or blood transfusion. 4. These properties are entirely absent from the blood of such animals as are not immune against tetanus; and when the poison of tetanus is introduced into these animals it is found after death in the blood-fluids of the body.

As to the rôle played by produced ptomaines in tetanus, it is now evident that the filtrate from pure cultures of the germ, when subcutaneously injected into animals, will cause the disease, but the exact nature of the poison is not yet known. Acting on the suggestion of Rosenbach, that some poison produced by the germ caused the peculiar symptoms of tetanus, Brieger, by his untiring work, isolated four distinct toxic substances from mixed cultures of the tetanus bacillus in sterilized emulsion of meat. These four substances, tetanin, tetanotoxin, muriate of toxin, and spasmotoxin, are now matters of history. More recently, Brieger has succeeded in isolating tetanin from the amputated arm of a patient

with tetanus; the other poisons were not found. The tetanin inoculated into the subcutaneous tissue of a horse produced muscular contractions lasting for a considerable time, but the characteristic symptoms of tetanus in a horse did not appear. As supplementary to Brieger's study of ptomaines in tetanus, the results of Knud Faber's investigations[4] may be mentioned. This observer endeavored to isolate the bacterium of tetanus, but failed to secure a pure culture; at best, two bacteria were cultivated together. Inoculations of these cultures invariably produced tetanus. They were obtained both in pus from tetanic patients and in the earth. In 23 specimens of earth examined, 16 contained these germs. They could not be found far below the surface and were absent in a specimen from a forest. From a sample of earth an exceedingly virulent culture was obtained which always produced true tetanus on inoculation under the skin or in the veins of animals. He thinks the poison is not the tetanic of Brieger, that it is not an albuminate body, but more closely related to the poison of diphtheria than to the ptomaines proper.

While up to this time no agent has been found upon which we can depend for successfully combating tetanus, with the beginning of this year comes also the hope that at a period not far distant we will have a comparatively certain means of overcoming the disease. If the recent observations of Behring and Kitasato can be substantiated, which now seems likely, we will have to record another victory over disease achieved by knowledge of its actual cause, and the employment by inoculation of substances which have for their object the destruction of that cause. The nature of the material used by Behring and Kitasato has not yet been published, but it is strongly probable that it is of animal origin and perhaps bears relationship to the already far-famed antitubercular lymph given to the world from the same laboratory. So far, inoculations against tetanus in the human subject have not been made, but the discovery of a substance which, injected into animals, enables them to withstand with impunity a dose of tetanic poison many times greater than that sufficient to kill a sound animal is, to say the least, suggestive and encouraging. Meanwhile, throughout the year, reports of recovery from the disease following the use of various agents have been recorded. Among the drugs most extolled may be mentioned the bromides and chloral, either alone

or combined; bromidia, gelsemium, antipyrin, paraldehyde, etc., all of which have more or less enthusiastic supporters.

In the line of local treatment directed toward the wound, we note from Lockwood[2 Oct. 26] the statement that various "observations seem to show that tetanus may at first be a local disease, thus favoring vigorous treatment at the point of inoculation." From the same stand-point, Marchisio[24 June 8] observes that in whatever way the tetanic symptoms are brought about, whether from the bacteria themselves or from the produced ptomaines, the disease is at first local, and active treatment should always be directed toward destroying the initial foci of infection. With this object he has employed successfully, in a case of fully-developed tetanus, excision of the infected area and the subsequent application to the wound of strong and long-continued sublimate baths. Toward the same end, in cases ending in recovery, Bidder,[69 Mar. 18] Povlini,[589 No. 9] Baccelli,[589 Jan.] and others have used about the injected area subcutaneous injections of carbolic acid of various strengths. Tizzoni and Catani,[589 Apr. 10; 22 June 4] in a large number of experiments with different chemicals to determine their effect on the spores and germ of tetanus, conclude that against this germ nitrate of silver has the most power, and that it should be used on primary wounds. In the strength of a 1-per-cent. solution the spores were destroyed in one minute. In their hands iodoform and iodol, after twenty-four hours of direct contact with the germ, had not affected their vitality. In contrast with this, Sormani[589 Jan. 12] records, as the result of experiment, that iodoform is especially to be recommended as a wound dressing in tetanus, and that it neutralizes perfectly the poison of the disease.

GANGRENE.

Our knowledge of the exciting causes by means of which the various phenomena attending gangrenous processes in the body are brought about is becoming gradually more definite. Recent investigations have had for their object the consideration of the many perplexing problems of bacterial agency in such conditions, and much room for further research in the same direction still exists. The death of tissue *en masse* is not, of course, always associated with bacterial invasion. For example, parts becoming necrotic from exposure to excessive heat or cold, or other caustic influences, remain aseptic until infected from without; but, nevertheless, as a

rule the gangrenous process is much encouraged and advanced by the part played by various micro-organisms.

With the growth of antisepsis in surgery, the death of an extremity following the application of a ligature to the principal artery is almost unknown,—an evidence that not so much from the inhibited blood-supply itself does the gangrene result as from the attendant septic inflammation, which hinders or prevents the establishment of adequate collateral circulation.

In coagulation necrosis, a condition closely allied to the so-called hyaline or fibrinous degeneration, although the part played by chemical processes is not yet clearly established, according to Senn, "there can be no doubt that this form of necrosis is nearly, if not always, of mycotic origin, and it must be regarded, practically, in the light of a bacterial necrosis."

Only moist gangrenes are putrefactive, and, as a rule, the general systemic involvement bears a relationship to the nature and extent of the infection with saprogenic organisms. Such forms of necrosis which do not depend on the presence of putrefactive organisms are not attended by foul odors or by other evidence of putrefactive changes. Putrefactive germs feed on dead tissue and require moisture for their development and growth.

Rosenbach has cultivated, from 2 cases of emphysematous gangrene, a peculiar spore-bearing bacillus, while other investigators have obtained from putrefying materials one or more varieties of the proteus micrococcus, as well as other forms of bacteria. In the field-mouse, an animal immune to the bacillus of septicæmia, Koch has produced, experimentally, a progressive gangrene from inoculations with chain micrococci not to be distinguished from the streptococcus pyogenes. Continuing his work, he has shown that the ptomainic products of bacterial activity may themselves cause the destruction of tissue, since, in the examination of specimens from the inoculated animals, the progressive necrosis was observed markedly in advance of the bacterial invasion. Indeed, certain chemicals have the power of causing cell destruction, independently of their tendency toward producing inflammation and quite apart from bacterial influence. Gas-producing bacteria differ from those which are saprogenic in character. When to a necrotic process in the economy there is added a rapidly-spreading emphysematous condition of the surrounding parts, with increased tension, crepita-

tion, the formation of gaseous bullæ, and a bronzed and streaky discoloration of the skin, an emphysematous gangrene is said to be present. Since the disease, once established, tends to spread rapidly to other parts of the body, being the most fatal form of gangrenous trouble, it has been called by the French *gangrene foudroyante*, and has been otherwise designated by various writers.

With the general advance in our knowledge of the infective wound processes, some definite information has been gained concerning the essential causative agents of this formidable condition. Some years ago, Pasteur observed in the serum from the peritoneal cavity or from the bruised muscular tissue of animals dead from septicæmia, an elongated, movable organism which he cultivated and inoculated, and finally named vibrion septique. More recently, an experimental condition has been produced in guinea-pigs and rabbits (Koch, Gaffky, etc.), to which Koch has given the name of malignant œdema, and the germ which he describes seems identical with Pasteur's organism. Finally, through the experimental observations of Chanveau and Arloing, Brieger, Ehrlich, and others, the fact has been practically established that the same germ which, on the one hand, may give rise in animals to malignant œdema, may, on the other, when engrafted in man on tissue the seat of a moist gangrene, produce the emphysematous condition which we have just described. The degree of gas-generating power in some other bacteria has still to be defined, and at this time the invariable importance of the vibrion septique in the production of emphysematous necroses cannot be conclusively established.

The organism in question resembles the bacillus of anthrax; it is anaërobic, of variable length and thickness, and is usually found in the form of rods made up of several bacilli joining end to end. The bacillus multiplies by spores, which are found either in the middle or at the ends of the germs. The cultivation of the organism is only affected by the exclusion of oxygen. By Pasteur this was accomplished in an atmosphere of carbonic-acid gas, and since his investigations various observers have obtained pure cultures by different methods.

The bacillus is widely diffused, being found generally in putrefying substances, in the superficial soil, and in the dust of hay. Substances containing it, when inoculated under the skin of guinea-

pigs, produce death in from twenty-four to forty-eight hours. At the autopsy a subcutaneous œdema is observed, beginning at the inoculated point. The œdema liquid is reddish and transparent and contains many germs, while in the connective-tissue spaces numerous gas-bubbles are found. The internal organs are not much changed, although the parenchymatous fluids contain the germ. According to Chanveau and Arloing, immunity is produced against the organism in those animals which withstand the inoculations.

Chapplain, of Marseilles, $\frac{3}{\text{Aug. 17}}$ has during the year expressed the opinion that gaseous gangrenes may be of different kinds, with distinct pathological lesions, and calling for different forms of treatment. He speaks particularly of 2 cases, one ending fatally in twenty-four hours, with general emphysema of the connective tissues, the other dying after six days. In this last case the gas was found only in the veins of the extremities, in the iliac, in the ascending cava, and in the right heart. He says that the course of the disease depends on the method of introduction of the poison. When this occurs through the connective tissue, its spread is unlimited and rapid; when through the vessels, the gaseous invasion only slowly extends beyond the confines of the extremity.

Reboul $\frac{152}{\text{Apr. 20}}$ has recently reported an interesting case of gangrenous septicæmia, occurring in a man of 20 years, and following an ugly wound on the left leg from a blow with a sword. The patient was treated primarily without regard to ordinary cleanliness, and, becoming very ill, was admitted into hospital four days after receiving the injury. On admission the wound was gangrenous, with thickened, everted edges, and on pressure discharged quantities of sero-sanguinolent fluid with bubbles of putrid gas. From the wounded area, extending quite to the fold of the groin, was a distinct gaseous crepitation. The extremity was swollen throughout its extent, and was distinctly bronzed in the neighborhood of the wound.

As evidence of marked septic poisoning, the general condition of the patient at this time was extremely bad; the pulse small, frequent, and irregular; entire loss of appetite; infective diarrhœa; and notable albuminuria.

Under the direction of Nélaton, Reboul immediately made, throughout the affected limb, numerous long and deep incisions with the knife and thermo-cautery, besides making with the latter

instrument applications to all intervening spaces, extending quite as far as the gaseous invasion.

To the lesions thus made sublimate solution (1 to 1000) was freely applied, and, following this, naphthol camphor in solution and the ointment of salol. Internally, naphthol and salicylate of bismuth were given, with quantities of alcoholic stimulants and an occasional dose of quinine. The patient immediately improved, but two days later the tumefaction and gaseous crepitation extended over the abdomen and as far as the base of the thorax. Again numerous incisions were made and treated as before.

The leg was by this time quite gangrenous. The crepitation did not advance beyond the new incisions and the general condition became considerably improved. In this improved state an amputation at the middle of the thigh was practiced one week after admission and eleven days after the receipt of the injury. The stump was left open and treated with abundant irrigations of sublimate solution, and, in addition, as before, with naphthol camphor and salol ointment. The patient made finally a perfect recovery.

In the same line, Ballenghein,[220] in a paper read before the Anatomico-Clinical Society of Lille, reports some striking results from local antiseptic treatment in cases of gaseous gangrene. He speaks of the value of open-wound treatment and the repeated employment of antiseptic substances in solution; and then, if the disease persists and the advancing microbe is not yet destroyed, of the great importance of large incisions (debridements) and deep punctures in every suspected focus of trouble with the thermo-cautery. He considers that this treatment, combined with carbolic-acid irrigations and the free use of iodoform and other antiseptics, offers the best possible means of combating the disease. This treatment should always be practiced in the beginning, and if the gangrene continue to advance, resisting methods at once so simple and so powerful, amputation should always be done unless absolutely contra-indicated by the condition of the patient.

Reasoning from these and various other observations, it would seem that in spreading gangrenous conditions the classical early amputation of affected members at a distance above the area of infection is, even if practicable, not always proper or expedient. That amputation should be done and done early in many cases is evident, but there are cases where so considerable an operation

could only be followed by speedy dissolution. For this reason it may often happen that, before subjecting an already weakened and infected patient to such additional shock, it would be wiser to seek to obtain, by all the means in our power, an amelioration of the general condition. That this can be accomplished in certain cases is clearly established, but no half-hearted measures will suffice. First of all, active, persistent, and radical efforts should be made toward dislodging and destroying the invading organisms and their attendant chemical poisons. To this end the early employment of the knife or thermo-cautery, one or both, is essential. Throughout the affected area extending to the limits of gaseous invasion, free, deep, and numerous incisions should be made without delay. In this way not only is all tension relieved and a chance given for the disease products to escape, but, in addition, an opportunity is given through such incisions for that most important object,—the thorough and constant application of antiseptic agents.

Throughout all the incisions and about the original wound, copious and repeated irrigations should be used. If possible, every suspected focus of trouble should be reached. When amputation is performed, either primarily or as a last resort, the stump should be left freely opened and treated in the same vigorous way. The antiseptic substance employed is of less importance than the thoroughness of its application. Corrosive sublimate, carbolic acid, naphthol, and other agents have been used with nearly equal results. The danger of poisoning from these agents, even the most potent, is small, and when occurring is easily overcome. The use of hot water alone, either by irrigation or by continuous bath, has its advocates and has been followed by the best results. Such other agents as iodoform, aristol, etc., may be used in ointment or powder as supplementary to the rest. By internal treatment we should endeavor in every possible way to sustain and strengthen the rapidly failing and infected patient, using abundantly alcoholic stimulants, quinine, iron, salol, and such other agents as may suggest themselves. Besides this, of course, proper nourishment is of the utmost importance.

The co-existence of emphysematous gangrene with tetanus has been noted from time to time by various observers, and in this connection Verneuil [100 Rev.] has recently announced some conclusions of interest. He says that this coincidence in man is not a matter of

chance, but it is due to the simultaneous introduction through a wound of the two specific microbes of Pasteur and Nicolaier; and that since these organisms are found in the same situations, notably in superficial cultivated soil, such double infection is all the more probable. The two diseases, although of contemporaneous origin, are not influenced at all in their development by each other, and the radical removal of the gangrene does not diminish the possibility of the subsequent appearance of tetanus. Other infectious diseases, as charbon, erysipelas, typhoid fever, etc., have been seen to develop in connection with tetanus, without having their clinical histories at all changed. Septic infection, on the contrary, is rarely or never seen as an associated condition, perhaps because of a microbic antagonism.

SEPSIS.

One of the recent writers on the subject of traumatic infectious diseases, Henry S. Stark, [59 Feb.] in an article which argues that they are not maladies *sui generis*, but rather secondary phenomena of microbic poisoning, says that the terms septicæmia, pyæmia, and septopyæmia no longer retain their original signification, but are, in fact, obsolete; and, further, that the entire pathology and etiology of the infectious diseases ought to be rewritten from the stand-point of the germ theory of infection. His own theory is: "that there is a traumatic disease *per se*, whose distinguishing characteristics are fever, infection, and suppuration; and that whether we call this disease 'suppurative,' or 'traumatic,' or 'putrid,' or 'pyogenetic fever,' or what not, the point is to recognize it as a distinct pathological entity."

That our views concerning the various septic processes in the organism have constantly to be changed or modified as time goes on is obviously true; and as on such subjects our accurate knowledge is but small and our theories numerous, we have, of course, still much to learn and perhaps more to unlearn. Nevertheless, with each year we mark some real advance, and find some points becoming gradually firmly established.

The consideration of the importance of one or more of the various micro-organisms in the production of a given disease and the conditions of soil which encourage or hinder their development and reproduction, and, in addition, the warfare against these organisms which is carried on in the body by both the fixed cells

and the leucocytes, and the part played by the chemical products of the bacteria themselves, still present problems which offer the largest and most fertile field for investigation.

Of the two distinct forms of sepsis now generally recognized, one is that of septic intoxication caused by the introduction into the circulation of preformed ptomaines from some local focus of putrefaction. This intoxication may be brought about by the absorption of poisons produced by the various bacilli of putrefaction, which develop in dead tissue exposed to atmospheric air, and which often possess gas-forming properties.

Among the most prominent putrefactive germs are the several bacilli saprogenes of Rosenbach and the proteus vulgaris, mirabilis, and zenkeri of Hauser. From the character of this form of septic poisoning it would seem that, unless the quantity of poison primarily introduced be sufficient in itself to overwhelm the organism, by a fatal intoxication, we may hope for the best results by vigorously attacking the infective foci to prevent further infection, and by aiding with stimulants and other agents the organism in its work of overcoming the poison already absorbed.

Clinically this is shown to be true by the brilliant results which have followed such treatment in certain gangrenous affections, and in the removal of necrotic masses from the uterus in some cases of so-called puerperal septicæmia (sapræmia).

The other variety of sepsis, the real septic infection (progressive septicæmia), is not caused by the germs of putrefaction or their products, but rather by certain micro-organisms which, entering the circulation from without, retain in the blood the power of reproduction and multiplication. In these cases the infection may occur directly into the blood-vessels or indirectly through lymphatic channels and connective-tissue spaces. For the production of this condition, while various microbes have been held by different observers as capable of playing a part, the germs of suppuration are usually at fault. The formation of pus at the primary wound is, however, not essential for its production. Septic infection may originate from wounds which do not suppurate at all, although a reason for the production in one case of suppuration and in another septicæmia, both from the same germ, is not apparent. The actual poison in cases of septic infection is probably not always the same.

In some experimental cases the symptoms seemed to follow the

absorption of fibrin factors liberated from dying leucocytes through the agency of the invading microbes, and some chemical product of bacterial origin may be considered as the exciting cause of septic symptoms wherever found.

The best treatment for septicæmia is, of course, prophylactic. With the growth of surgical antisepsis, septic infection is much less commonly encountered than formerly, and the reason is obvious. When once definitely established, our most potent local and general measures directed against the disease too often prove unavailing. The wound from which the affection originates should in every case be freely opened and treated antiseptically, and as in septic intoxication, and for more reason, we should, in addition to this vigorous local treatment, employ with a lavish hand such internal stimulants and antiseptics as may in any degree assist nature in her work of overcoming the poison.

It is still questionable whether in the production of pus we have invariably an infection with some pyogenic micro-organism. On this point very capable authorities are at variance. G. Lemiere [220 May] has recently succeeded in producing local suppuration in various animals by injecting subcutaneously small quantities of aseptic metallic mercury. The pus in these cases was carefully investigated, and was shown both by microscopical examination and by culture experiments to be free from germs. In the opinion of the author, the suppuration was due to the chemical action of a mercurial compound formed by the reaction of some organic liquids upon the metal.

The experiments were made on dogs, cats, rabbits, guinea-pigs, and rats, and differed according to the inflammatory reaction of the animal. Dogs and cats responded sooner than the others, and frequently suffered local necroses of the skin. In the other animals complete recovery, with absorption of the abscess-contents, was the rule. The suppuration produced no pyæmia and no visceral metastases. In some cases a cellular metastasis through lymphatic channels was observed. In the hands of this observer pus formations were produced in rabbits in a long series of experiments, although this animal is generally considered to be able to resist aseptic suppurations. It is easy to understand that, if certain aseptic chemical substances can produce suppuration, converting living cells into pus-corpuscles, the same effect may be looked

for by the chemical products of the pus-microbes themselves. In this connection it has been shown that the ptomainic products of pus micro-organism may cause the formation of pus which does not show by the most careful examination a single germ. The suppurations so produced do not extend far into the tissues, but are circumscribed, the progressive suppurative infections requiring a continual reproduction of the microbes and their attendant ptomaines. Of course, all these changes may be considerably modified and controlled by the character of the soil with which they are associated.

Massert and Bordet [31 Feb. 15] have conducted experiments on the irritability of leucocytes, especially in reference to inflammatory conditions. They have investigated the tactile sensibility and chemical sensibility of these cells, and also their irritability in the presence of anæsthetics. They claim that the marked sensibility of the leucocytes to various irritants may rationally explain many of the phenomena of inflammation, especially cellular infiltration and phagocytosis.

Romme [164 Apr. 24] has recently written an interesting article on what he calls the coefficient of absorption, especially in reference to the etiology of acute peritonitis. After citing the experiments of Baraban, Wegner, Straus, Pawlowsky, Grawitz, Waterhouse, and others, on the action of various bacteria and noxious agents when introduced into the peritoneal cavities of animals, he goes on to say that certain poisonous substances, whether chemical or ptomainic, or the microbes themselves, when brought in contact with the peritoneal cavity in limited quantities, are rapidly absorbed and afterward eliminated by the various emunctories without giving rise to trouble either in the peritoneum or in the organism at large.

In his opinion, there exists a certain correlation between the rapidity of absorption and that of elimination; but if from any cause this harmony is disturbed and the poisons remain for any time unabsorbed, they will exercise their noxious influence first on the peritoneum itself and afterward on the general system.

Senn states that Rinne has shown that if the absorptive capacity of the tissues at the seat of infection be diminished, the septic processs are encouraged; and, on the other hand, that the rapid absorption, destruction, or elimination of pus-microbes prevents septic inflammation. He concludes that the fact is strongly

suggested "that in man infection with pus-microbes causes progressive sepsis if the germs are introduced in large quantities into tissues debilitated by a trauma, antecedent pathological conditions, or the action of preformed ptomaines."

TRAUMATIC NEUROSES.

By E. C. SEGUIN, M.D.,
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RATHER less attention has been given to this subject during the past year, and it cannot be said that our knowledge of it has been at all deepened. Some good clinical work has, however, been done in this country and in Europe. Discussions bearing more especially upon the diagnosis and medico-legal relations of such cases occurred in the American Neurological Association, the American Medical Association, the International Medical Congress at Berlin, (Neurological Section) and others. The debate between observers who think "traumatic neurosis" should be considered a separate and distinct clinical type or symptom-group, and those who hold that the various cases described under this heading should be classified as cases of neurasthenia and of hysteria having a traumatic origin, still continues, with the best of the argument, we think, on the latter side; for the more histories are published, the more does the similarity, if not identity, between the traumatic and the (long-known) non-traumatic cases become apparent.

Semeiology and Diagnosis.—Walton, of Boston, [242 July] in an excellent critical paper, expresses great reserve as to the absolute value (as regards simulation) of many symptoms, such as paresis, anæsthesia, urinary troubles, and fast pulse. He especially warns physicians against too ready an acceptance of the patient's statement that he was perfectly well before the accident. He gives an analysis of the symptoms presented by 100 consecutive cases seen by him at from one week to three and a half years after the receipt of injury. In 17 cases there were unmistakable evidences of disease of the vertebræ or of organic disease of the cord. In 1 other case there may have been simulation, as the patient (who objected to a thorough examination) recovered soon after receiving heavy damages. In the remaining 82 cases all possible nervous symptoms were present, in every sort of combination; a list of

them fills more than half a page of the journal. The following important symptoms were carefully noted: Pain in the head and back, 46 cases; in back alone, 24; in head alone, 6 cases; total, 76. Sensitiveness of the back, 40 cases. Pain in other parts in a lesser number; no constant relation observed between seat of injury and of subsequent pain. Hemianæsthesia of left side, 10 cases; of right side, 7 cases. Numbness complained of in 40 cases: in lower extremities, 10 cases; in upper extremities, 2 cases; in trunk, 2 cases; over whole body, 4 cases. Paresis (loss of power), in 30 cases: in left arm and leg, 7 cases; in right arm and leg, 4 cases; both legs, 12 cases; in left leg, 8 cases; in right leg, 1 case; in both arms, 1 case. In no case (and this is important) was loss of power or anæsthesia limited to a region supplied by a special nerve, motor or sensory. True atrophy of muscular groups not observed, though emaciation was sometimes present. Tendon reflex increased (without clonus), 31 cases; in rest of cases it was within normal limits of variations. Ankle-clonus not seen. The pupils were normal in general, unequal in 4 (left larger in all). No alteration of electrical reactions observed. Size of legs at calf measured in 57 cases: alike in 20, right calf larger in 21, left larger in 16. In no case did the difference exceed $\frac{5}{8}$ inch (15 millimetres). Stiffness of the back present in a considerable number of cases. Average of male pulses was $90\frac{1}{2}$ beats per minute; of female pulses, $95\frac{3}{4}$; variations great (59 cases noted). The general nutrition was found good in 60 cases, fair in 18, poor in 3, not noted in 1. Lastly, as to age, Walton makes the most suggestive statement that, with one exception (at 15 years), he has never known the symptoms to occur; yet children under 17 are not rarely injured, and, we would remark, are very prone (especially young boys) to nervous and hysterical symptoms. This would tend to show that self-study and auto-suggestions are factors worth considering in the genesis of traumatic neuroses.

Knapp, of Boston, $\frac{99}{\text{Dec. 12, '99}}$ read before the Boston Society for Medical Improvement a very practical paper on the methods of examination of cases involving suits for damages for real or supposed injuries to the brain and spinal cord. While there is nothing absolutely new in the essay, it is one which will prove of much use to the general practitioner, and might be studied with advantage by many so-called experts. The examination of the conditions of

various functions (determination of symptoms) is described in a systematic manner, with comments showing the author's experience and critical acumen. If any criticism is to be made of this paper, it is that, like the author's essay of 1888, it is too much condensed or abbreviated; more ample details would have been of much use to the physician. One important point is omitted, viz., the desirability of observing such cases (as is done in Germany and France) in hospitals, where constant observation and repeated examinations will surely lead to a better appreciation of the state of *bona fide* cases, and to the detection of malingerers. We are too often called upon to formulate an opinion on a complicated or doubtful case after one or two examinations made at the patient's home, where he has every possible aid in carrying out a deception.

Rumpf, of Marburg,[69 No. 9] insists upon the necessity of a strict method of examination, and thinks he has established three new objective symptoms which cannot be simulated: 1. With respect to the verification of real neuralgia or tenderness. As discovered by Mannskopf, when pressure is made upon the painful or tender region (vertebra or other part), the patient's pulse grows more rapid in a few seconds, rising from 84 or 92 to 100 or 120 beats per minute. This increase lasts for two or more minutes after pressure is stopped; besides, the pulse becomes smaller during the test. R. found this present in 8 cases of traumatic and in 4 cases of non-traumatic neurasthenia, absent in none; and he claims to have detected one malingerer by this means (the pulse did not rise during the test, and patient confessed later). He proposes to call this the neuralgic or traumatic cardiac reaction. 2. Quantitative reduction of galvanic excitability of motor nerves. This is a late symptom, often not appearing until a year or more after the injury. In the normal ulnar and peroneal nerves, the first CaCC occurs with from 0.5 to 2 milliampères; in cases of traumatic neuroses, with from 4 to 10 milliampères. While in the normal state CaTet is obtained with from 4 to 11 milliampères, in neurotic cases from 20 to 25 milliampères are required. In the case described the differences are not very great, except for CaTet. 3. A peculiar symptom, verified in 10 cases, is that after faradization of a nerve-trunk the contraction does not completely subside, but is followed by quite large, fascicular and

fibrillary contractions lasting several seconds. These contractions are not limited to the muscles which have strongly contracted, but occur in adjoining or associated ones. The same phenomenon appears after exertion in cases of traumatic neurosis. This symptom has never been observed in healthy persons, and it cannot be simulated. Rumpf proposes to call this the "traumatic reaction." He pushes his skepticism to the extent of doubting the value (generally admitted) of concentric limitations of the visual fields, and he also thinks that oscillations in the limits of anæsthetic areas are suggestive of simulation (a statement contrary to general experience). He does not deny that injuries are followed by hysteria and neurasthenia, but he would make a distinct class of cases presenting the severe symptoms. In the Neurological Section of the Berlin Congress [41 Oct. 16] widely-different views were expressed as to the value of sensory symptoms. Schultze, of Bonn, read a paper in which he denied their value, and went so far as to include the limitation of visual fields. He also denied that there was any objective symptom by means of which we can surely distinguish real from assumed neuroses. Oppenheimer maintained the value of limitation of visual fields. Hitzig, of Halle, and Rumpf, who cited also Schmidt-Rimpler, had very rarely, or never, found this symptom.

Hoffmann [4 June 21] observed limitation of the visual field in only 1 out of 10 cases, though in 2 other cases it had been noted by other observers.

Morton Prince, of Boston, [99 Dec. 12, '99] reports a case of a man who had two attacks, six years apart, with very similar symptoms, after very different injuries. The first was a kick in the mouth by a horse, causing unconsciousness; the second was a fall off a street-car on his right shoulder, back, and knee (only stunned). After both injuries symptoms were paralysis of hands and arms, different knee-jerks, local anæsthesia (most in the injured leg). A very suspicious circumstance in this case is, it seems to us, that the grasp, as tested on a weak dynamometer, was *nil.* This is extremely rare in real paralysis, and should always be accompanied by corresponding loss of power in the arms. Shattuck, in commenting on the case, shrewdly observed that during his first attack this man had had a good chance to educate himself in semeiology.

Eisenlohr, of Hamburg, [4 Dec. 30, '99] criticises Oppenheimer and other

writers for having included many diverse types of nervous troubles resulting from concussion under the head of "traumatic neuroses," and proposes a classification somewhat like that suggested by the reviewer in last year's ANNUAL, but much less complete, and not at all systematic. Strümpell, of Erlangen, [34 Jan. 14] reports a case of right hemiparesis and hemianæsthesia of the full hysterical type (special senses affected) immediately following a stab-wound over the second cervical vertebra. The diagnosis, from organic paralysis due to a cut in the spinal cord, was easy, because in this case the sensory and motor symptoms would have been on opposite sides of the body, and the special senses would not have been affected. Besides, if the spinal cord had been cut, pupillary and facial vasomotor symptoms would have appeared (Brown-Séquard's spinal hemiplegia). He takes occasion to repeat his conservative statement that nervous injuries are followed by hysterical symptom-groups, as well as by the peculiar (?) symptoms which most German observers call traumatic neuroses, as distinguished from neurasthenia. Sometimes the diagnosis is difficult. Hoffmann, of Heidelberg (inspired by Erb), [4 June 21] would classify cases in three categories: real, exaggerated, and simulated. Dutil, of Paris, [55 Nov. 20, '90] reports 3 very similar cases of hysterical hemianæsthesia, with ovarian points ("*ovarie*"); yet 1 was due to a railway injury in a man, while 2 were caused by overwork in women. The same similarity between traumatic and non-traumatic cases of hysteroid disorder is illustrated by 2 interesting cases of "neuropathic spinal disease," reported by Savill, of London. [418 V. 19] A very interesting point in Dutil's male case is the presence of an hysterogenic area in the iliac region on the anæsthetic side. What becomes of the *ovarian excitability* in female cases (as viewed by gynæcologists) in the light of this case? Bremer, of St. Louis, [275 Feb.] recognizes the frequency with which sensory and motor symptoms occur on the same side of the body as that on which the head is injured, and calls them equilateral symptoms, as distinguished from contralateral. (This had been noticed by Charcot and others before.)

Jacoby, New York, [150 Dec., '90] makes a plea for the classification of cases of "traumatic neurosis" under the head of the two well-known conditions of hysteria and of neurasthenia, or of a combination of the two. (Compare reviewer's scheme of classification in last year's ANNUAL.) He describes a case (female) of removal of

multiple tumors of forearm and arm, followed by paralysis of that arm and total (senses affected) hemianæsthesia on the same side, and calls it traumatic hysteria. Clevenger, of Chicago, in a paper read before the Jurisprudence Section of the American Medical Association, 2 Sept. 4 makes a strong argument in favor of applying the term *Erichsen's Disease* to the symptom-groups in question because he was the first to call attention to them. This will hardly meet with approval, partly because we are approaching a scientifie grouping of these cases and partly because most physicians are convinced that Erichsen's book was not written in a scientific and unselfish spirit. Gapen, of Omaha, satirically suggested that perhaps the name would not be inappropriate, because Erichsen ought to bear the obloquy which attaches, in a large degree, to the whole subject in England and America.

Brunelli, of Rome, 589 July 1 in reporting a case of hysterical symptoms following railway injury, to the Real Acad. Med. di Roma, remarks upon the great rarity of the condition in Italy. This statement, if true, is extremely instructive, especially if we remember that such cases were almost unknown in Germany prior to 1870 and in France till much later. This appearance of a new "disease" long after its chief cause (railway injuries) had been active is important as bearing on the question of the proportion of malingerers and exaggerators.

Etiology and Pathology.—No material advance has been made in these directions. Proofs are accumulating to show that the results of psychic shock (moral shock) are identical with those of physical shock (commotion), and some observers would still claim that the psychic element (fright, mental tension, sense of responsibility, etc.) is largely present in the apparently mechanical cases. A very instructive case, as bearing on the potency of fright, was reported by Dana, of New York. 59 p. 477, '90 A man, aged 50 years, after having touched a wire fallen from an electric street-lighting apparatus, became unconscious (?) and developed at once hemiplegia and hemianæsthesia, with other stigmata characteristic of hysteria. The wire, however, was a "dead" one, and no current had reached the man.

Watson, of Jersey City, 59 Oct. 18 performed a large number of experiments on dogs with a view to elucidating the effects of falls from a height (25 feet) upon the buttocks and of blows deliv-

ered directly upon the spine. The results do not throw much light on the question of "spinal concussion" as now before the profession; that is, they do not enable us to understand the tardy or secondary nervous symptoms which appear after accidents which produce no gross lesions of the nervous system. He found that great force was required to produce pathological changes in the spinal cord, and that nearly always lesions were produced in other viscera at the same time. Yet it is well known that the full series of symptoms included under the terms traumatic neuroses, etc., appear after most various degrees of violence or as a result of fright or psychic shock. The author's researches are, therefore, of more value to the general surgeon than to the neurologist.

Schmaus, of Münich, [84 July 18] reports autopsies of 3 cases, but, unfortunately, the clinical part is so scanty and defective as to render them worthless. His experiments are better. He chose rabbits, and produced "spinal concussion" by holding the animal up in the air, placing a ruler or board on the spine, and striking this a number of times with a hammer. In some cases only temporary paraplegia occurred; in others, after repeated blows, a permanent paraplegic state, with incontinence of urine, atrophy of muscles, loss of hair, etc. (sensibility not mentioned), animals dying in from two to twenty days. In all cases there were no gross lesions. Microscopically, the chief lesion found was rupture and degeneration of many axis-cylinders scattered irregularly over the whole of the spinal section-area. Hæmorrhage was noted only in 1 case; degenerative gliomatous changes in foci occurred in several cases (resembling the lesions found in 2 of his human cases). He assumes that many fibres must have been "exhausted" or physiologically killed without showing changes visible with our present methods.

Rumpf, of Marburg, [69 No. 9] is inclined to regard Sperling and Kronthal's findings (*vide* last year's ANNUAL) a step in the right direction. He considers that those cases which present true objective symptoms should be separated from the hysteric and neurasthenic cases, and recognized as a special class, for which he prefers the term "cerebro-spinal commotion." Clevenger, of Chicago, [99 Sept. 4] defines "Erichsen's Disease" to be a serious disturbance of the functions of the spinal cord, without demonstrable lesions, the symptoms being all directly due to the "original sympathetic

system derangement." Walton, of Boston, [242 July] considers it extremely difficult to injure the spinal cord except through the medium of its bony canal; yet admits having seen cases in which there were clinical evidences of such injury (hæmorrhage, etc.), but these were not controlled by autopsies. He rejects the term "concussion" of the cord. The causal influence of auto-suggestions and of suggestions by medical attendants and relatives is generally admitted in America as a factor of some value; and the evil influence of too solicitous sympathy has been referred to by several authors, but not, we think, with enough emphasis.

Prognosis and Treatment.—Believers in the frequency of simulation, like Judd (*vide* next section) consider recoveries numerous. The hysterical cases appear to be curable, while the severe neurasthenic form causes prolonged, chronic ill-health and incomplete recoveries. Bremer, of St. Louis, [275 Feb.-Mar.] admits that many cases recover, others improve so much that the patients are able to pursue some less arduous occupation, but that there almost always remains a deficiency or flaw in nervous tone. He reports a typical case of traumatic neurosis suddenly cured by the desertion of the patient's wife; he got up and went to work to earn his and his children's livelihood. Bremer also admits cures by payment of damages, and states that he has known several cases in which trephining had been done without the slightest benefit. Rumpf [69 No. 9] states the prognosis of real traumatic neurosis as dismal, but rendered much more so by the custom of prolonged and multiple examinations by successive physicians. Hoffmann, of Heidelberg, [4 June 21] is the only writer of the year who gives figures. In 11 cases of real traumatic neurosis 1 was cured, 1 improved, 8 remained unchanged. In 6 cases of exaggeration of symptoms 1 was cured and 2 nearly so. Of 8 cases of malingering 7 were "cured" and 1, finding himself about to be exposed, went away. Bremer advises only tonics and a hygienic mode of living; cold water and galvanism, judiciously applied, are of benefit. Does not mention seclusion, which, in our opinion, is most valuable, and should be resorted to early, before the patient is too thoroughly educated in neuropathology. As usual, the French and German articles say next to nothing of treatment.

The Medico-Legal Question.—Observers still disagree as to the frequency of malingering. Hoffmann [4 June 21] observed eight simulants

in 24 cases, or 30 per cent. He succeeded in obtaining confession from several. One man had been taught by his physician how to produce epilepsy, he (the physician) to receive one-tenth of the damages. Another said that several persons had told him to simulate anæsthesia. Patients more often apply to physicians for certifications of their condition than for treatment. This remark is also made by Rumpf, and every observer must be struck by its appropriateness. Hoffmann does not know of any certain means of detection. Fraenkl, of Buda-Pesth, 57 July 20 says that cases of simulation frequently claim damages of railways. Rumpf considers simulation not rare, and proposes some new objective symptoms for its detection. He requires prolonged observation in hospital (in one case for nine months) before giving a definite final opinion. At the meeting of the American Medical Association 99 Sept. 4 Judd, of Galesburg, Gapen, of Omaha, and Kiernan, of Chicago, agreed as to the frequency of malingering; the first-named observer considering it the rule (*vide* last year's ANNUAL), and he challenged his opponents to cite cases of "spinal concussion" following injury received under circumstances in which no one but himself or his own family was blamable. Knapp ridicules this, and attributes the statement to bias; but, as Walton pointed out 99 Dec. 26 in the discussion, patients or claimants have now abundant opportunities for self-instruction in nervous diseases. It seems to me that any one reading through the now large collection of cases of "traumatic neurosis" cannot but admit that nearly all come within the scope of Judd's challenge. Yet great numbers of people receive concussion accidents in various ways, without developing the secondary symptoms which are so frequent after railway injuries, or such as are received under circumstances which make claim for damages possible. Bremer 275 Mar. also points out that many claimants "read up" on the subject, and receive "points" by the frequent examinations to which they submit, or, rather, which they seek.

The subject of simulation came up in the Neurological Section of the International Medical Congress at Berlin 41 Oct. 16 after a paper by Schultze, of Bonn. The author stated that simulation was frequent, and that positive means for its detection were wanting. Oppenheim said it was rare. Seeligmuller, of Halle, would place his estimate at 25 per cent. instead of Oppenheim's 4 per cent. Hitzig,

of Halle, placed the proportion less high. Mendel, of Berlin, agreed with Schultze, particularly as to the small value of so-called objective symptoms.

Donath, of Buda-Pesth, [84 Sept. 27] agrees with Strümpell and Oppenheim in considering simulation as rare. Walton [242 July] does not commit himself as to the proportion of malingerers and exaggerators, but he evidently thinks it is not small. In the discussion on this paper (in the American Neurological Association) Knapp was disposed to be much less skeptical as to the reality and seriousness of the symptoms complained of; he and Putnam, of Boston, Dercum and Mills, of Philadelphia, thought that few persons could successfully carry out, under severe investigation, a system of simulation. I would, however, point out that in this country, at least, claimants are very rarely subjected to thorough scientific watching and to repeated examinations; the physician or "expert" is expected to deliver an opinion after one or two interviews with the patient, so that the chances of detecting simulation are much reduced. Such cases should be obliged by the Court to submit to residence in a hospital under the observation of physicians appointed by itself. In this way the profession might escape the obloquy which now attaches to medical testimony in all such cases.

SURGICAL DRESSINGS AND ANTISEPTICS.

By JOHN H. PACKARD, A.M., M.D.,
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Only a slight survey of the surgical literature of the past year is needed to convince any one that the antiseptic idea is, in the minds of the vast majority of surgeons, the most important of the time. No very great development has occurred in regard to it; but it has been discussed at great length by many writers, and the indications are increasing that, in one form or other, it must remain an integral part of the surgery of the future.

Of the articles which have appeared on the subject we may specially note one by Reynier, $^{24}_{\text{Mar.11}}$ one by Dhourdin, $^{230}_{\text{Dec.'89,Jan.}}$ and one by Laboulbène. $^{208}_{\text{Jan.18}}$ These are all historical. The general features of the method have been dealt with by Terrier, $^{8}_{\text{Aug.20}}$ by Fournier, $^{67}_{\text{July 20}}$ by Baudouin, $^{73}_{\text{Sept.27}}$ by Folet, $^{14}_{\text{Dec.28}}$ by Billroth, $^{8}_{\text{Mar.27}}$ by Lucas-Championnière, ^{1151}; $^{443}_{\text{Apr.}}$ by Verneuil, $^{100}_{\text{Nov.21,'89}}$ by Benedict. $^{117}_{\text{June}}$ The applications of the antiseptic method in military surgery are discussed by Noël, $^{14}_{\text{May 21}}$ and more in detail by Chaput. $^{14}_{\text{June 4}}$ Articles in defense of the antiseptic method have been published by Oviatt $^{59}_{\text{Jan.18}}$ and Duncan. $^{1000}_{\text{Jan.}}$ I have left it to the last to mention a paper by Lister, $^{2}_{\text{Aug.16}}$ on "The Present Position of Antiseptic Surgery," and one by Tait $^{2}_{\text{Sept.27}}$ on the same subject. The former is a clear and fair statement of some of the later phases of the scientific and practical features of the antiseptic system; the latter, called in its sub-title a "criticism" of the former, is, in reality, a very bitter attack upon "Listerism," which is said to be on its last legs, and again, within a few lines, is declared to be as dead as Julius Cæsar, and to have developed a new phase. I would note also another article of like bearing by Black. $^{22}_{\text{Oct.20}}$ If these gentlemen, Tait and Black, are correct in their views, it is very extraordinary that so many surgeons of intelligence and experience adhere to a system which is "as dead as Julius Cæsar," and are even trying to develop and improve it.

Vance $^{202}_{\text{Jan.25}}$ seeks to enforce the antiseptic doctrine by means of

a series of "don'ts," setting forth the things which are to be avoided in practice. Terrier [3 Aug. 20] thinks that in sterile wounds asepsis should be practiced, antisepsis being reserved for those which are already infected. He uses sublimate solutions, 1 to 1000 or 1 to 2000, for the latter purpose. He has the dust laid by spraying sterilized water in the room where he is to operate. His ligatures and sutures are prepared by boiling in a 1-to-1000 sublimate solution; his instruments are subjected to dry heat (320° to 356° F.—160° to 180° C.), cleansed with chloroform and boiled in sterilized water; the protection towels are heated to 248° F. (120° C.) and dipped in warm, sterilized water. For dressing, he uses sterilized wadding without any antiseptic material.

Our corresponding editor, Diakonoff, of Moscow, sends us a notice of a thesis by Preobragensky on the materials used for dressings. The author thinks that the efficiency of the dressings now used depends not upon their antiseptic qualities, but upon their physical properties; that by their absorbent power, and the ready evaporation of wound secretions afforded, conditions favorable to the development of micro-organisms are prevented.

The dry method in aseptic operations and wound-dressing is fully discussed and warmly advocated by Kurz, [69 Nov. 20] on the ground of the experience of himself and Vanzetti at the Policlinic at Florence. As carried out by them it secured excellent results. Only the operator and one assistant were allowed to touch the parts. Their hands were sterilized by washing with soap and water, and then with alcohol. No irrigation was used, but only mopping with masses of antiseptic gauze. The small amount of bleeding met with was remarkable; Péan's forceps were never used. Silk was employed for sutures and ligatures. All bleeding being checked, the wound was accurately closed from the bottom by means of deep sutures, so as to leave no "dead spaces" for accumulation of wound secretions. "American plaster" (rubber plaster?) was employed to a great extent. Drainage was discarded except in wounds already infected, and then was made by means of glass tubes. It is stated that the cases were nearly all sent to their homes immediately, without any harm resulting. Other articles advocating the dry method have been published by its inventor, Landerer, [382 Feb.] by C. Koch, [475 Mar.] by von Bergmann, [21 Dec. 30, '89] by Gellens, [454 Aug.] by Wyman, [271 Sept.] and by Byford. [96 Oct.]

On the other hand, a moist antiseptic dressing, consisting of glycerinated iodoform gauze, sublimate gauze, rubber paper, and a muslin bandage, is advocated by J. Weir. [224 Sept. 27]

A novel idea is suggested by Roux [197 Dec. 30, '99] with the view of dispensing with bandages. He sutures the dressings to the part by means of iodoformized silk thread or catgut. It does not appear that any advantage is thus gained, although a long list of operations is given in which the author claims to have carried out his method with great satisfaction.

Nicolson [81 Apr.] thinks that too little attention is paid to antiseptic principles in the treatment of small wounds. He advocates thorough cleansing, suturing, and the application of iodoform so as to develop a firm and unirritating scab.

The introduction and thorough carrying out of antiseptic methods in French military practice would seem, according to Noël, [14 May 21] to demand very great changes in the mode of organizing the medical staff, in the arrangement of the ambulances, and in the nature or quantity of the supplies furnished.

The germicidal power of certain of the fluids of the body has been discussed. [61 Apr. 12] It appears that in fresh blood-serum, in the fluid of ascites, and in that of hydroceles, certain bacilli die, just as they do in distilled water. But the explanation is probably to be found rather in the fact that these fluids are not favorable to the growth of the organisms than in any destructive power; in other words, the effect is merely a negative one. From experiments on dogs, however, Fodor [22 Apr. 16] has been led to believe that alkalies, and especially the bicarbonate of soda, convert the blood into a powerful bactericide, and that subcutaneous injections of this substance will prove the most effective agent against anthrax.

MATERIALS.

A new antiseptic under the name of "per-iodate" is very highly lauded by O'Connor. [22 Jan. 28] It is described as a compound of periodic acid with metallic oxides and alkalies of a non-toxic character, but its chemical formula is said to be still under investigation. It is said to be a most powerful disinfectant, its destructive effect upon bacilli being instantaneous, even in weak solutions, while the antiseptic properties claimed for it are extraordinary. At the same time it would seem to be quite harmless when given

internally. O'Connor justly says that his statements as to the performances of this article are "startling," and if they are borne out by further experience a long stride has been taken toward the realization of the idea of perfect antisepsis.

Two new articles have been proposed $_{\text{June 21}}^{2}$ as substitutes for iodoform,—"annidaline," formed by the action of iodine upon phenol in the presence of iodide of potassium and caustic potassa, and "aristol," an analogous result of the same process, but with thymol and soda substituted for phenol and potassa. Annidaline is a dark-red powder, soluble in alcohol, benzol, and chloroform. Aristol is a reddish-brown powder, soluble in alcohol and readily in ether. Both are insoluble in water, and are odorless; they are non-irritant to the skin, and have been somewhat extensively used as dusting-powders.

Mattei and Scala $_{\text{Sept. 12}}^{836}$ confirm the theory advanced by others, that the antiseptic property of iodoform and iodol depends upon the decomposition of these substances, with the liberation of iodine.

In a preliminary paper, Heuston $_{\text{Nov. 5}}^{2}$ recommends sulphite of zinc as a non-poisonous, non-irritative, and stable antiseptic for the preparation of gauze. The chemistry of this substance is discussed by Tichborne, and a table of operation cases in which it was employed is given by Heuston, whose statement of his experience was confirmed by the testimony of Franks.

The germicide powers of sulphurous acid have been made the subject of experimentation by Thoinot $_{\text{Aug.}}^{262}$ with very positive results in its favor as to certain microbes, viz., those of tubercle, of glanders and farcy, of typhoid fever, of Asiatic cholera, and of diphtheria. In a closed chamber, 60 grammes (2 ounces) of sulphur to the cubic metre, with an exposure of twenty-four hours, gives absolute certainty of the destruction of these organisms.

Strong testimony to the value of creolin is borne by Zielewicz. $_{\text{May 10}}^{844}$ Against its objectionable qualities, the milky character of its solution and its unpleasant odor, he offsets its efficiency as an antiseptic, and its non-irritating effect when properly diluted, as well as its deodorizing power. He mentions especially its applicability in disorders of the urinary bladder and in operations on the uterus, and recommends it for washing out the pleura. It may also be used to great advantage for douching the stomach in cases

of cancer of that organ. Creolin is regarded by Munk [22 Oct.] as an excellent styptic, with great antiseptic and bactericide power.

With regard to pyoctanin, Iasinski [844 Nov.] says that, although suppuration is checked by its application in strong solution, there is soon set up a strong inflammatory reaction, the wounds assume an unhealthy appearance, and the secretion of pus is greater than before. He thinks it has neither antiseptic nor antisuppurative properties. He does not deny the bactericide power of this agent, but justly remarks that a surgical antiseptic and an antiparasitic in experimental pathology are two widely different things. Petersen [21 July 7] has used pyoctanin, both blue and yellow, in three forms,—in pencils of the solid drug, in powder (1 part to 500 of pulverized talc), and in watery solution, of a strength varying from 1 to 100 to 1 to 2000. He seems to have found them especially efficient in the treatment of venereal sores, and in diseases of syphilitic origin affecting the eye or the nasal mucous membrane. This article is very favorably spoken of also by Stilling. [113 Oct. 19]

Sugar is said by Dannheiser [96 Apr.] to be used with great advantage in wound-dressing at the Strasbourg clinic. It is used in powder or incorporated with wood-wool. Formerly impermeable coverings were placed over it, but these have now been abandoned. During the war of the rebellion I found powdered sugar, freely applied, most effective in arresting hospital gangrene.

For the rapid preparation of surgical gauze, Helbing [9 Aug. 9] advises dissolving the antiseptic substance—carbolic acid, iodoform, or whatever is preferred—in ether, and then soaking and wringing out the gauze several times. It will dry readily if unfolded and shaken.

Naphthol-camphor (1 part of β-naphthol with 2 of camphor) is highly recommended by Schwartz [9 Jan. 11] for the saturation of gauze for dressing ulcers, or for application in cases of suppurative otitis, or in cold abscesses. A somewhat similar article, camphophenique, is highly recommended by Crosswhite. [100 Jan.] Two cases of its use adduced by this author concern wounds only. Bryce [2 Nov. 22] reports some experiments with hydro-naphthol which seem to show it to be a powerful antiseptic, but as it is insoluble in water he employed a mixture of rectified spirit and glycerin. He thinks it can hardly find an extensive application in surgical practice until a cheap and reliable method of dissolving it can be devised.

Lister's double cyanide of mercury and zinc is highly spoken of by White [9 Nov. 21] and Ceccherelli. [22 June 4] The future of this article, however, seems to be doubtful. Barling [2 Sept. 13] says that he has found it non-irritating to the skin, satisfactory as an antiseptic, and not open to the objection that the cyanide dusts out. Lister himself, however, is said to be at present engaged in modifying it; at least, as to the mode of its preparation.

An author [101 Jan.] asks some pertinent questions in regard to the chemistry not only of the double cyanide, but of its predecessor, sal-alembroth. He thinks the former is not of so definite composition as to warrant the idea of uniformity in its action, and suggests that hydro-naphthol can be used so as to obtain the desired result more easily and more certainly. Dott [6 Nov. 20, '89] declares that if the double cyanide is formed in the first instance it is certainly almost completely decomposed in the subsequent washing with water, and hence that the ultimate product is not a double salt at all, but a cyanide of zinc, retaining perhaps a small proportion of mercury, either as a cyanide, an oxy-salt, or an oxide.

Tavel [31 Nov. 6] enters a plea for the use of common salt in solution, 1 to 7000, as a valuable antiseptic in surgery. Before use it is to be boiled for an hour, and its higher boiling-point than that of plain water renders its sterilization more effective. Corrosive sublimate is more readily dissolved in it than in plain water. Moreover, it is a well-known fact that the addition of salt to water lessens the irritating effect of the latter upon the cut surfaces of the tissues, and very notably upon the opened peritoneum. If a demilitre (about a pint) of saline solution is left in the abdominal cavity at the end of an operation in which the patient has become much prostrated, it is said to act therapeutically, as if injected into the veins. Experimentally, Tavel has obtained very complete bactericidal effects from the saline solution. Very similar testimony is borne by Fritsch. [60 May 8] He uses solutions of the strength of 1 to 6000.

Neve [6 June 14] calls attention to the risk attending the use of antiseptic solutions in cavities and sinuses, with the view of hyperdistending the latter, as in this way recent adhesions may be broken up or the extent of sinuses be increased.

Ackley [161 Sept.] records a case in which a young man had the skin and fascia stripped down from several inches above the malleoli to

about the middle of the metatarsus; a surgeon who was called cleansed the wound with sublimate solution, about 1 to 700 or 800. Three days later, violent dysenteric symptoms ensued, with great depression, and the skin sloughed to a considerable extent.

Bokenham [2 Feb.16] records some experiments with sodium silicofluoride ("salufer"), a salt introduced by Thomson in 1888, and described by him as a powerful, but not poisonous, antiseptic. It proved very efficient in preventing fermentation, but was intensely irritating—in fact, fatally so—when introduced into the stomach or peritoneum of the guinea-pig. Bokenham tested it cautiously upon himself and some friends, and found that it caused extreme nausea and eructation, with slowing of the pulse; and he therefore abandoned further trials of it.

Bloch [91 Nov.30,'89] proposes a modification of the antiseptic dressing, to obviate the risk of articles prepared for this purpose losing their efficiency. He advises the sterilization of absorbent gauze by wrapping it in two layers of filtering-paper, tying it up in a bundle, and subjecting it to steam for half an hour; it is then allowed to dry in the heater, and is thoroughly sterilized. For use, it is dipped in water with 3 per cent. of phenic acid, applied, and covered again with dry, absorbent gauze, bound on with a bandage of the same, and the whole covered in with non-absorbent wadding. This author discusses the objections to corrosive sublimate, iodoform, and carbolic acid, to each of which, but particularly to the first named, he thinks there are grave objections. He uses solutions of carbolic acid for irrigation, as well as for the sterilization of instruments and of catgut, and for preparing the drainage-tubes of red caoutchouc which he employs.

From experimental researches, Ehlers [336 Mar.5] has satisfied himself that antiseptic dressing materials, which are dried and kept in that state, cannot, by virtue of their chemical impregnation, be regarded as sterile; that the latter process is insufficient, unless the raw material has been first sterilized by boiling or by exposure to a current of steam; and that the substances which are to be used dry must be sterilized by dry heat. Salzmann and Wernicke [116 Mar.] have investigated the causes of the deterioration of dressing materials prepared with sublimate. This change is not due to the properties of the wood-wool fibres, so much used in Germany, but to impurities in the solution, and especially to free alkali, or to

sulphate salts. Besides these may be mentioned the volatilization of the sublimate itself, the influence of air and light, impurity of the glycerin employed in the solutions, the water-proof wrappings, grease, etc. If 7 to 10 per cent. of chloride of sodium and a corresponding amount of glycerin be used, and the raw material is impure, the result may be a preparation which, after a time, will contain very little sublimate. Only a small proportion of chloride of potassium need be used, with distilled water. No more than 5 per cent. of pure glycerin is necessary. The formula given is: Mercuric bichloride, 50 parts; potassium chloride, 75 parts; glycerin, 750 parts; distilled water, 14,250 parts; acid fuchsin, 1 part.

Asbestos-paper is recommended as a material for dressings by Duquaire.[211] It is said to be soft to the touch, very absorbent, easily carried in quantity, and cheap; it can be sterilized completely by setting it on fire, when the cellulose contained in it is burned up and the residue is left for use either with or without soaking in antiseptic liquid. This article was reported upon to the Société Nationale de Médecine de Lyon by Arloing,[211] in very favorable terms. Ollier also stated that he had experimented with it, but, while his results so far supported the statements of its proposer, he was not prepared to pronounce positively that it was better than other materials for aseptic dressings.

Turf- or peat- moss (sphagmus) is very highly recommended by Kronacher,[34] as a wound dressing; it has great absorbent power, and thus takes up the secretions readily. A combination of this article with wadding (moss-wadding) is said to be "the most ideal" dressing imaginable. It may either be treated with special antiseptics or merely applied over sterilized gauze.

Zinc-glue (made with oxide of zinc and gelatin) is advocated by Cordua,[60] as a substitute for collodion; it does not tend to contract so much, and is, according to Unna, slightly antiseptic.

A new form of protective gauze tissue is described by Renton,[2] as non-irritating and non-adhesive. It consists of coarse, pale book-muslin, stretched and soaked with a mixture of isinglass, glycerin, water, aniline solution, sublimate solution (1 to 4000), and chloride of ammonium. The proportions are not given.

Silk-paper and a charpie prepared from it are said by Giacich,[8] to make an excellent dressing material. It is stated

that the articles have been patented in all the European states and in North America.

Régnier [91 Nov. 10, '89] advocates the employment of charpie, sterilized by heat and stored for use in previously sterilized tin cases. Bloch [336 Aug. 22] employs sterilized cotton, without antiseptics, for the dressing of wounds. After an operation, performed with the usual well-known precautions, he applies a double layer of gauze, then a layer of absorbent cotton, and then a layer of ordinary cotton, all these being sterilized. He claims that microbes of various kinds may be found in the wound secretions, even when there has been no pus formation; cultivations from them gave the staphylococcus albus, sometimes the staphylococcus pyogenes aureus, and bacilli. This he found to be the case with other modes of dressing also.

An old Cossack practice has been brought forward with commendation by Pashkoff. [26 Feb. 1] It consists in dressing recent wounds, of whatever kind, with a thick layer of ashes prepared by the burning of cotton or linen stuffs; this is said to form with blood a protective scab. Washing with solution of boracic acid is usually performed first. Lanolin is recommended by Gottstein [14 Mar.] as a basis for an antiseptic ointment, with sublimate solution. He thinks this preparation, about 1 to 1000, more efficient than irrigation with a solution of the corresponding strength. According to Bassini, [22 June 4] the best dressing for wounds is cotton-wool (raw cotton) saturated with salicylic acid, enveloped in disinfected gauze. Silk he prefers to catgut for sutures. He employs drainage if the wound is not disinfected and is discharging. The best disinfecting fluids, in his opinion, are made with sublimate, or with salicylic or carbolic acids.

The lightness and firmness of isinglass would make it an admirable material for solidifying dressings, but that it hardens very slowly. To obviate this, Englisch [6 Jan. 18] adds to a thick solution of soda isinglass one-quarter the amount of finely powdered magnesia, with trituration. Into the yellowish-white pultaceous mass thus formed the unrolled bandages are put, and when saturated are rolled upon a wooden cylinder. They must not be exposed to the air for more than fifteen or twenty minutes, and are applied over a double layer of ordinary muslin bandage. Hardening takes place in from three to ten hours, according to the temperature of the room.

An artificial antiseptic sponge (so called) has been devised by von Poehl, [4] consisting of a rubber bag filled with sublimate solution and wrapped in several yards of mull or gauze. On pricking a hole or holes in the bag the liquid flows out and saturates the wrapping, which may be used either as a sponge or as a bandage. One can hardly attach any great practical value to such an arrangement.

The sterilization of catgut can certainly be effected, according to Döderlein, [99] by twenty-four hours' soaking in a 1-to-1000 watery solution of corrosive sublimate. Brunner [99] advises that the raw gut be scrubbed with potash soap and then soaked in ether for half an hour; next it is placed for twelve hours in sublimate solution, 1 to 1000; then kept until used in a mixture containing 1 part of sublimate, 100 of glycerin, and 900 of absolute alcohol. Immediately before use it is laid again in a watery sublimate solution, 1 to 1000. The same author, in another article, [84] reviews the opinions of various writers for and against the use of catgut, and the different methods employed in its preparation. His own experience has been that by means of dry heat (130° C. or 266° F.), continued for one hour, catgut became perfectly sterile, but at the same time so brittle as to be useless; sometimes its suppleness and tenacity returned, but it could not be relied upon. By Reverdin this deterioration was attributed to the fatty matter contained in the gut, but Döderlein thinks it due rather to the rapid loss of water. He advises, therefore, that the gut should be wrapped in cotton or paper, and the temperature raised gradually, so that the drying shall not be effected too quickly. Before using gut so prepared, it should be dipped in hot sterilized water; it will then hold well when knotted. On account of the greater convenience of carrying, the dry method of preparation is to be preferred.

According to Fowler, [59] a thorough sterilization of catgut can be best effected by boiling it for one hour in 97-per-cent. alcohol; this process adds to the tensile strength of the material, makes it less slippery, and does not notably diminish the readiness of its absorption. The sterilization of catgut by exposure to dry heat (130° C. or 266° F.) is advocated by Larochette. [211] He describes the eighteen processes through which this material passes in the manufacture, and his experiments, from which he concludes that it is better *not* to treat the catgut with ether for the removal of fatty

matter before the heating. This heating process should be gradual, so as to dry the gut slowly, and it should be done in a large oven.

For the disinfection of catgut, it is recommended by Brunner[13 Mar.15] that it should be scrubbed with potash soap, then placed in ether for half an hour, and finally soaked for twelve hours in 1-to-1000 sublimate solution. It may be kept in a mixture of 100 parts glycerin and 900 parts absolute alcohol, with 1 part of corrosive sublimate; just before using, it should be again placed in a watery sublimate solution. The same author states[80 Apr.15] that, while catgut is made perfectly sterile by treatment either with sublimate solution or with dry heat, neither carbolic acid, chromic acid, nor oil of juniper can be depended upon for this purpose. Cushing[170 Jan.] sterilizes catgut by soaking it in ether for forty-eight hours, then placing it for ten days in a mixture of 3 parts alcohol to 1 of oil of juniper; adding to each quart 3 drachms of hydro-naphthol. Silk is objected to by Cushing as a material for ligatures or sutures, unless absolute asepsis can be maintained; its meshes absorb secretions, and it becomes a source of trouble until removed or thrown off.

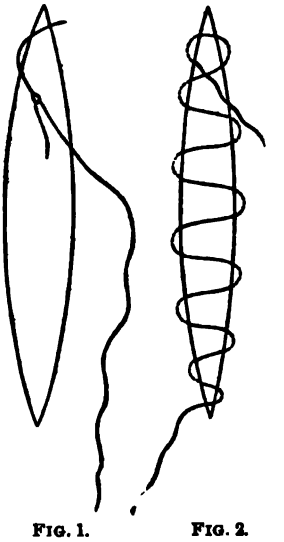


FIG. 1. FIG. 2.
FRANKS' SUBCUTICULAR SUTURE.

Fig. 1, needle in position, showing how the first suture is inserted. Fig. 2 shows the appearance of the wound when the whole of the continuous suture is inserted, before it is tightened. The dotted line shows the portion of the suture beneath the cuticle.

(*British Medical Journal.*)

Franks[2 Feb.22] describes the subcuticular suture used by him in closing wounds, especially in exposed parts of the body, in order to avoid disfigurement. He employs very fine catgut and a small, curved needle, preferably that known as Hagedorn's. The cuts will show the mode of application.

Marcy[99 Feb.15] again advocates buried animal sutures, preferring those made from kangaroo-tendon to those made of catgut. Burt thinks that the catgut made for clockmakers is perfectly satisfactory prepared as follows: It is cut into suitable lengths, etherized if desired, and soaked a day or two in 1-to-20 carbolic-acid solution; to this is then added a 1-to-6000 solution of chromic acid, for a few hours only, when the gut is taken out and quickly dried; for

use it needs only a few minutes' exposure to a 1-to-20 cold carbolic-acid solution. Hale [59 May 10] states his favorable experience in the use of silk for buried sutures.

Bogdanik [8 Feb. 1] uses silver wire for the suturing of bone, carbolized catgut for ligatures. On account of the well-known slowness of absorption of chromicized catgut, he prefers it in performing the operation for the radical cure of hernia by Macewen's method; the ligatures make their way out after a long time, by suppuration.

STERILIZATION OF INSTRUMENTS.

An apparatus for sterilizing steel instruments by steam without rusting them is described and figured by Cathcart. [86 Aug.] It consists of a receptacle surrounded by a chamber; the instruments are put into the former and the steam admitted into the latter, which has an opening to be plugged up as soon as the carbonic acid is all driven off and the inner chamber brought to the desired temperature; then the steam is admitted into the latter for as long a time as may be thought proper; the steam is turned off, the lid removed, and the instruments will be found dry. For the sterilization of instruments, Perron [454 Mar.] advocates the use of a mixture of 1 part of ether, 1 part of ammonia or potassa, and 10 parts of 95-per-cent. alcohol. For the sterilization of rubber tubes, etc., Poncet [2 Nov. 22] recommends dry heat; he advises that the temperature be gradually raised to 140° C. (284° F.), and that the instruments be then placed for keeping in an inert powder (pulverized talc being, in his opinion, the best), which has itself been previously sterilized. He objects to the strong antiseptic solutions advocated by Auvard, as likely to affect the surface of the rubber.

STERILIZATION OF HANDS.

The sterilization of the surgeon's hands has been made a subject of fresh experimentation by Boll. [69 Apr. 24] The method pursued was to dip the hands for one minute, with movement, in a broth-culture of staphylococcus pyogenes aureus, and then to let this dry; then to wipe off the hands, after which they were scrubbed with warm water and soap, bathed in solutions of carbolic acid and sublimate for one minute, and the nails and subungual spaces cleansed with iodoform gauze. In one set of experiments the washing lasted three minutes, in another two, and in a third one

minute. Thus, the whole process took five, four, and three minutes, respectively, in the different classes. Now the hands were washed for two minutes in sterilized water, and then dipped for thirty to sixty seconds in luke-warm fluid gelatin. In the first set the gelatin remained sterile; in the second and third, it did not always. When the cleansing of the nails and subungual spaces was omitted, colonies formed; and this was the case also in two experiments in which the disinfectants were not used.

DRAINAGE.

Wound treatment without drainage is strongly recommended by Réczey.[113] He urges that sublimate solutions should be employed with certain limitations: they should not be used in excess; none should be left in the wound; they should not be used in the case of persons with intestinal or renal disease, nor in the anæmic and decrepit, except with great caution. Combinations of antiseptics are, in his opinion, valueless. The important points, according to him, are: 1. Accurate asepsis during operations. 2. Complete arrest of bleeding. 3. Opening up of all cavities, even if the incisions required are large. 4. Well-applied antiseptic dressings, left undisturbed long enough. With careful attention to these matters he has, since 1885, dispensed altogether with drainage, and claims that the results obtained by him bear out his views. Gross,[3] writing on the same subject, thinks that drainage should only be employed if complete asepsis and the accurate apposition of the parts by means of deep as well as superficial sutures cannot be effected. He regards a drain-tube as a foreign body, and as a possible avenue for septic organisms. He draws a distinction between healthy or aseptic tissues and those which are already infected. The subject of the use and abuse of drainage-tubes has also been discussed by Godlee.[15] In a historical sketch he recalls the fact that they have been employed from time to time since the days of Celsus; that they were brought forward by Lister as an essential feature of his system, in the further development of which it is sought to do away with them. Godlee thinks they are of great value in the treatment of acute abscesses, and in some cases of the chronic and subacute form, as well as after operations involving large wounds. He urges that the tubes used should not be unnecessarily long, and that they should be removed early.

An article by Hektoen [779 Dec., '90] contains abstracts of the histories of 10 cases of important operations, treated without drainage, and with primary union. The principles laid down as resulting from these and other experiences are the same as those of the authors just quoted. Fessler [34 May 27] recommends the use of strips of protective silk for the purpose of drainage, claiming that it is at the same time effective, unirritating, and easily removed, without interfering with the subsequent healing of the wound.

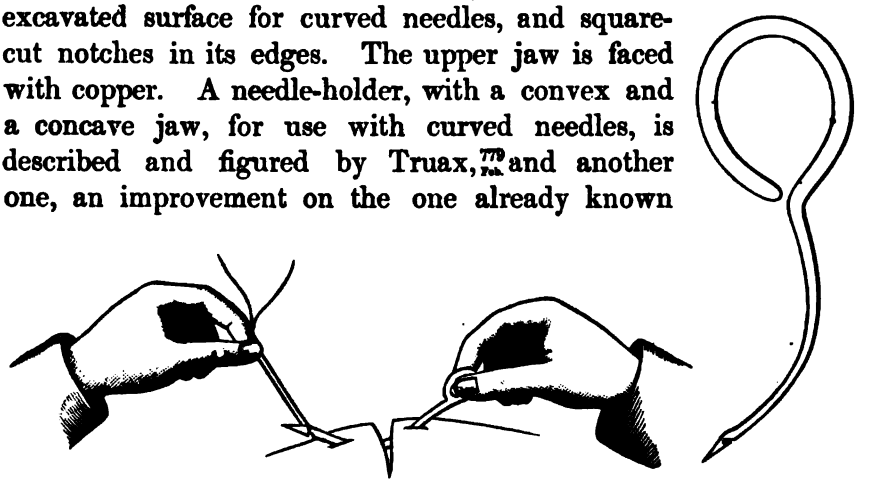
An ingenious arrangement has been described by Vance, [224 June 20] by which drainage-tubes are removed from a wound without disturbing the dressings. In an amputation, for instance, he takes two short rubber tubes and connects them by a loop of catgut so that each one can be placed at one angle of the wound, extending a short distance into it; to the free end of each tube is next attached a rubber loop, which is carried up along the corresponding side of the stump, put slightly on the stretch, and fastened by a strip of rubber plaster. In a few days the catgut loop yields and the tubes are at once drawn out into the dressings. Another way is to dispense with the catgut loop, and to merely attach to the outer end of each tube a ligature or a piece of gauze long enough to reach up beyond the dressings; by pulling on this the attached tube can be drawn out.

INSTRUMENTS.

Long [121 Apr.] discusses the forms of instruments which favor asepsis; he condemns all handles except those of metal, or of hard rubber baked on, and all avoidable roughening, lettering, or other irregularities of the surface. Scissors and forceps should, in his opinion, have pivot-locks, on a plan similar to that of Simpson's obstetric forceps. All this is very good, but I would suggest, as an earnest advocate of the most thorough antiseptic surgery, that experience has shown that the old-fashioned instruments *can* be sterilized; and that perhaps the very fact that those of more modern pattern are more readily cleansed may lead to some relaxation of diligence in this most essential matter. An antiseptic lock for surgical instruments, devised by Edebohls, [59 Mar. 15] consists in a ball-and-socket arrangement, rendered steady by a double shoulder on the male blade. Boone [235 Sept.] describes and figures a clamp-forceps for securing and ligating deep-seated arteries.

Duke [2 Sept. 27] has devised a needle-carrier shaped something like

a trephine, the needles to be inserted (it would appear from the cut, as there is no detailed description) in a slot at the end of the stem, and secured by a binding-screw. I must confess that I know of no conditions under which such an arrangement could possibly be as convenient as any one of the needle-holders in common use. A somewhat similar appliance, but with the handle in a line with the stem, instead of at right angles to it, has been described by Leviseur.[1 Jan. 18] A "universal" needle-forceps is described and figured by Pfaff.[1 Oct. 18] Its distinctive feature is in the shape of the lower jaw, which is a disk, with an excavated surface for curved needles, and square-cut notches in its edges. The upper jaw is faced with copper. A needle-holder, with a convex and a concave jaw, for use with curved needles, is described and figured by Truax,[779 Feb.] and another one, an improvement on the one already known



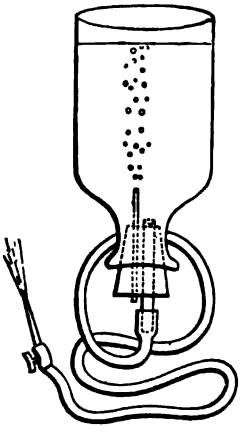
New Suture-Needle. (DeMoon.)
(*Illustrirte Monatsschrift für aerztlichen Polytechnik.*)

by his name, by Hagedorn.[336 Mar. 8] I may, perhaps, here state my very decided preference, for all ordinary suturing of wounds of the skin, for the gorget-shaped needles devised by this surgeon. Still another forceps for the use of these needles has been described by Parkinson.[147 Feb.]

A block-tin suture-plate for the securing of relaxation sutures is described by Powell.[2 May 24] It is oval and about ½ inch in diameter, with a projection $\frac{3}{16}$ inch high in the middle, like a post, with a shoulder at its free end as well as where it joins the plate. The suture being in place, its free end is passed through a hole in the plate and post; the plate is applied on the skin so as to give the requisite degree of tightness to the suture, which is then wound around the post and fastened by engaging it in a notch in the upper shoulder.

A new form of suture-needle, or rather a combination and adaptation of several old forms, is proposed by de Mooij. $^{71}_{Aug.1}$ It is a curved needle, with no eye, but a notch on the convexity close to the point. It is thrust through both lips of the wound to be united, and the thread is caught in the notch and drawn into place by the withdrawal of the needle. (See cut, page 15.) A cutting-forceps for the removal of wire sutures has also been devised by Duke. $^{6}_{May\,10}$ It is no doubt convenient for the purpose, but the ordinary instruments answer so well that a special appliance is scarcely demanded.

A sort of double needle, like a serre-fine with two sharp points, is advocated by Kierulff $^{44}_{May}$ as a substitute for ordinary sutures. He ascribes its invention to Surgeon Hoff, U. S. A., and claims for it the advantages of very ready application and removal, of security, and of easy sterilization.



RABINOWITCH'S IRRIGATOR.
(*Laitopise khirurgicheskago Obshestva v Moskvai.*)

Our corresponding editor, Diakonoff, of Moscow, writes of two simple forms of irrigators. One, devised by Rabinowitch, $^{852}_{No.2}$ consists of a V-shaped glass tube; on the stem is fitted a hollow rubber ball, to one branch a short rubber tube, and to the other branch a long one with a nozzle and stop-cock (for which may be substituted a clip). The long tube being closed, the short one is introduced into the liquid to be employed and the ball compressed; on expansion the latter will fill with the liquid; the long tube being now opened and the ball compressed, the liquid will be driven out through the nozzle, and by alternate compression and expansion a regular siphon action may be kept up. The other apparatus, devised by Ambrochewitch, is merely a cork perforated for two glass tubes, one of which is twice the size of the other, and has a rubber tube with a nozzle and stop-cock (or a clip); the larger tube just penetrates the cork, the other passes beyond it an inch or more. A bottle of suitable capacity is filled with the liquid to be used, the cork is inserted in it and the bottle reversed; on opening the rubber tube the liquid will flow out. (See cut.)

ANÆSTHETICS.

By J. M. BARTON, A.M., M.D.,
AND
LAWRENCE WOLFF, M.D.,
PHILADELPHIA.

For the resuscitation of persons who have stopped breathing from the effects of anæsthetics,[9 Feb. 22] the slowly interrupted current, applied to the phrenic nerve, is recommended. The rapidly interrupted current can only be used as a peripheral stimulant like a dash of cold water. The hypodermic use of ether is ridiculous when it is considered that the respiration centres are already depressed by the anæsthetic.

Coats[213 Nov.] states that anæsthetics interfere in three ways with respiration: 1, by direct obstruction to the entrance of air, causing both laryngeal and palatine stertor; 2, by retardation and stoppage of circulation in the lungs; and 3, by interference with the nerve-centres.

Chloroform paralyzes both the cardiac and the respiratory centres. The cardiac interference may be both direct and reflex by stimulating the vagus. The direct influence is upon the intrinsic ganglia and the heart-muscle. The nerve-centres are the last to be affected by anæsthetics.

To stimulate the heart's action, alcohol may be advantageously administered before giving an anæsthetic. With heart diseases ether only, and with respiratory affections chloroform only, should be administered. When narcosis is to be kept up for a long period, it is best to begin with chloroform and to continue with ether in small quantities. In chloroform narcosis there should always be a free access of air.[214 Sept. 15]

In long narcosis where ether is contra-indicated, morphine and atropine should be given previously to lessen the amount of chloroform needed. There is no mixture of anæsthetics which can be used with all patients in the same manner. Every poison

has its special dose. The difference between chloroform and ether is one of quantity only. The precaution necessary is not to give the poisonous dose, be it ether or chloroform.

Anæsthesia through hypnotism has been again reported. Thus, Bramwell[2] hypnotized a woman from whom were then extracted 3 teeth without pain. Another woman was put to sleep through reading a letter which ordered her to do so, whereupon 16 roots were removed; she awoke smiling. A boy, aged 8, had the first phalanx of his great toe amputated without experiencing any pain while in a hypnotic state. Froelig[184] quotes a case of anæsthesia by hypnotism, during which a large abscess in Scarpa's triangle was opened. He arrived at the conclusion that laceration of tissues is more apt to awaken an hypnotized patient than simple incised wounds; also that traumatism is often apt to be followed by a nervous crisis, on awakening from hypnotism, similar to that after chloroform narcosis.

CHLOROFORM.

The Hyderabad Chloroform Commission.—Surgeon-Major Lawrie,[6] to prove the correctness of the teachings of Syme that chloroform can be administered with perfect safety, providing the respiration is closely watched, induced the Nizam's government to appoint a commission to test these teachings by experiments. Hehir, Kelly, and Chamarette were accordingly appointed, and from a series of experiments arrived at the conclusion that chloroform always arrests the respiration before the heart's action.

The *Lancet* refused to accept these conclusions, whereupon Lawrie proposed a second commission with a representative from the *Lancet.* Lauder Brunton was selected and the Nizam's government contributed £1000 to defray his expenses. The second commission consisted of Surgeon-Major Lawrie as president and Lauder Brunton, Bomford, and Rustomji D. Hakim as members. The members of the first commission also were associated in the work and assisted therein. The conclusions of the second commission were the same as those of the first,—that chloroform always arrested respiration before the heart.

The second commission commenced work on October 23, 1889, and was in session until December 18, 1889, from 7 A.M. until 5 P.M., excepting Sundays and holidays.

Surg.-Major Lawrie, $^{6}_{Jan.16}$ in his report of the second Hyderabad Chloroform Commission, states that scores of dogs have been killed with chloroform, and invariably failure of respiration was the cause. He has given it for over twenty years without a single death, and in all deaths reported in Great Britain since 1855 there was not one in which any proper attention was paid to respiration.

The second Hyderabad Commission was divided into two committees, one consisting of Brunton, Bomford, Hehir, and Chamarette; the other, called the sub-committee, was composed of Rustomji, Kelly, and Gay. The sub-committee performed 403 experiments, the committee 27, making in all 430 experiments. In every case where chloroform was forced, the respiration stopped before the heart, and in the majority of cases the latter ceased to act in from two to six minutes after the stoppage of respiration. These results were not influenced by any variation in the manner of preparing the animals for narcosis, nor in the way of giving the anæsthetic. Artificial respiration restored the animals nearly always if commenced within thirty seconds after cessation of respiration, seldom, however, if within thirty to sixty seconds, and never after sixty seconds; it was less successful if morphine had been administered before. The majority of the experiments were made upon dogs and monkeys.

The object of the commission is stated as follows:—

1. To test the suitability and safety of chloroform as an anæsthetic and in comparison with ether and the A. C. E. mixture. 2. The effect of pushing the same to a dangerous degree. 3. The modifications produced by different degrees of asphyxia by these anæsthetics and by different drugs. 4. To test the alleged liability to syncope through shock or fatty degeneration of the heart; also, through hæmorrhages or change of position. 5. The effects of anæsthetics on different animals.

The conclusions arrived at by the second commission may be summarized as follows:—

Chloroform, when administered freely diluted with air, causes a gradual fall in blood-pressure—provided the animal is not prevented from breathing.

The greater the degree of dilution, the less rapid the fall.

The fall continues after the chloroform has been stopped, owing to the absorption of the residue in the air-passages. Res-

piration may stop, therefore, after the chloroform has been discontinued.

Struggling produces a more rapid fall in blood-pressure, as it leads to more rapid inhalation.

The combination of struggling and gasping, owing to the application of the inhaler being made too close, leads to dangerous depression.

Slowing or temporary stoppage of the heart is not dangerous.

The temporary exhaustion of the vagus after stimulation, and not the actual stimulation thereof, produces danger. The controlling influence of this nerve upon the heart is the safeguard.

Operations could not produce syncope. Direct irritation of the vagus by electricity prevented the fatal effects of prolonged chloroform narcosis. The liability to shock is not increased by chloroform narcosis; if it does occur, chloroform tends to prevent danger.

Chloroform narcosis does not endanger cases of fatty heart, but other slight exertions may produce death in those affected with such heart-lesion. Hæmorrhage has no effect upon the narcosis. Position has no other influence than that of gravity. Different animals are similarly affected. Ether cannot cause anæsthesia unless air is entirely excluded.

The practical conclusions resulting from the work of the second commission are as follow:—

I. The recumbent position on the back and absolute freedom of respiration are essential.

II. If, during an operation, the recumbent position on the back cannot, from any cause, be maintained during chloroform administration, the utmost attention to the respiration is necessary to prevent asphyxia or an overdose. If there is any doubt whatever about the state of respiration, the patient should at once be restored to the recumbent position on the back.

III. To insure absolute freedom of respiration, tight clothing of every kind, either on the neck, chest, or abdomen, is to be strictly avoided; and no assistants or bystanders should be allowed to exert pressure on any part of the patient's thorax or abdomen, even though the patient be struggling violently. If struggling does occur, it is always possible to hold the patient down by pressure on the shoulders, pelvis, or legs, without doing anything

which can by any possibility interfere with the free movements of respiration.

IV. An apparatus is not essential and ought not to be used, as, being made to fit the face, it must tend to produce a certain amount of asphyxia. Moreover, it is apt to take up part of the attention which is required elsewhere. In short, no matter how it is made, it introduces an element of danger into the administration. A convenient form of inhaler is an open cone or cap, with a little absorbent cotton inside at the apex.

V. At the commencement of inhalation, care should be taken, by not holding the cap too closely over the mouth and nose, to avoid exciting, struggling, or holding the breath. If struggling or holding the breath occurs, great care is necessary to avoid an overdose during the deep inspirations which follow. When quiet breathing is insured, as the patient begins to go over, there is no reason why the inhaler should not be applied close to the face; and all that is then necessary is to watch the cornea and to see that the respiration is not interfered with.

VI. In children, crying insures free administration of chloroform into the lungs; but as struggling and holding of breath can hardly be avoided, and one or two whiffs of chloroform may be sufficient to produce complete insensibility, they should always be allowed to inhale a little fresh air during the first deep inspirations which follow. In any struggling persons, but especially in children, it is essential to remove the inhaler after the first or second deep inspiration, as enough chloroform may have been inhaled to produce deep anæsthesia, and this may only appear, or may deepen, after the chloroform is stopped. Struggling is best avoided in adults by making them blow out hard after each inspiration during inhalation.

VII. The patient is, as a rule, anæsthetized and ready for the operation to be commenced when unconscious winking is no longer produced by touching the surface of the eye with the tip of the finger. The anæsthetic should never, under any circumstances, be pushed till the respiration stops; but when once the cornea is insensitive the patient should be kept gently under by occasional inhalations, and not allowed to come out and renew the stage of struggling and resistance.

VIII. As a rule, no operation should be commenced until the

patient is fully under the influence of the anæsthetic, so as to avoid all chance of death from surgical shock or fright.

IX. The administrator should be guided as to the effect entirely by the respiration. His only object, while producing anæsthesia, is to see that the respiration is not interfered with.

X. If possible, the patient's chest and abdomen should be exposed during chloroform inhalation, so that the respiratory movements can be seen by the administrator. If anything interferes with the respiration in any way, however slightly, even if this occurs at the very commencement of the administration; if breath is held, or if there is stertor, the inhalation should be stopped until the breathing is natural again. This may sometimes create delay and inconvenience with inexperienced administrators, but experience will make any administrator so familiar with the respiratory functions under chloroform that he will in a short time know, almost by intuition, whether anything is wrong, and be able to put it right, without delay, before any danger arises.

XI. If the breathing becomes embarrassed, the lower jaw should be pulsed, or pushed from behind the angles, forward, so that the lower teeth protrude in front of the upper. This raises the epiglottis and frees the larynx. At the same time, it is well to assist the respiration artificially until the embarrassment passes off.

XII. If, by any accident, the respiration stops, artificial respiration should be commenced at once, while an assistant lowers the head and draws forward the tongue with catch-forceps, by Howard's method, assisted by compression and relaxation of the thoracic walls. Artificial respiration should be continued until there is no doubt whatever that natural respiration is completely re-established.

XIII. A small dose of morphine may be injected subcutaneously before chloroform inhalation, as it helps to keep the patient in a state of anæsthesia in prolonged operations. There is nothing to show that atropine does any good in connection with the administration of chloroform, and it may do a very great deal of harm.

XIV. Alcohol may be given with advantage before operations under chloroform, provided it does not cause excitement, and

merely has the effect of giving a patient confidence and steadying the circulation.

If the foregoing rules are followed, the commission has no doubt that chloroform may be given in any operation with perfect ease and absolute safety, so as to do good without the risk of evil.

J. F. W. Smith[6] considers that the conclusions of the Hyderabad Commission, to watch the respiration alone, is as erroneous as to diagnose typhoid fever by the temperature alone, or by the diarrhœa alone. It would seem to him to have been better if their ideas had been submitted to criticism before uttering such emphatic opinions. The practical test for them will now be the death-rate from chloroform after these opinions have been so broadly promulgated.

McKendrick, Coats, and Newman[2] agree with the Hyderabad Commission, that death occurs from failure of respiration, and that it is the most frequent cause of death; also, that chloroform causes gradual falling of the blood-pressure, and that if pushed this may be dangerous. They, however, differ with it in regard to the pulse, as certain unexplainable depressions occur during the administration of chloroform which are not due to asphyxia, but which can be recognized only by the pulse.

Arthur Neve[2] reports 3000 chloroform administrations without a death, and the cases in which danger was threatened were very few, and due to arrest of the breathing, easily relieved by artificial respiration.

C. E. Sheppard[6] thinks the Hyderabad Commission has made no positive investigation in regard to primary syncope. The percentage of typical cases in their experiments is very large, contrasting markedly with what occurs in the human subject. It is only by careful attention to pulse, pupil, conjunctival reflex, color, and temperature of skin that the experienced anæsthetizer is able to conduct his patient through a truly perilous journey, and not, as the commission would make it seem, a perfect easy and safe procedure.

Alexander Wilson[90] holds that the work of the Hyderabad Commission has not made chloroform any safer, for, while it may not cause cardiac paralysis, it produces as sudden and equally fatal vasomotor paralysis and respiratory paralysis in addition. The amount of chloroform inhaled depends on the respiration, but the

effect of it on the way in which it is utilized in the circulation. Therefore, a proper knowledge of the condition of the circulation is most essential to the intelligent administration of an anæsthetic.

Surgeon-Major Lawrie,[6] states that in the experiments of the Hyderabad Commission 598 animals were used. He further says that whenever the pulse had been watched as a guide the death-rate has been 1 in 1236; whereas, in 45,000 cases, extending over a period of forty years, where respiration alone was taken for a guide, not one death had occurred. Sudden death may occur from stoppage of the heart, but not from chloroform itself; and, if the surgeon is to have constantly before him the fear of this, and watches the pulse for signs which only indicate a fatal issue, he cannot give his undivided attention to the respiration, by which alone avoidable danger can be invariably averted.

J. H. Potter,[6] differs with Surgeon-Major Lawrie, and says that in asphyxia there is increased blood-pressure, with lividity; in fatal chloroform narcosis, diminished blood-pressure and pallor; and that the contention that the danger is due to asphyxia, and not to direct action of chloroform, is therefore erroneous.

Lawrie,[6] answers that the commission had shown that sudden fall of blood-pressure with pallor was due to indirect stimulation of the vagus. The tracings further show that asphyxia, contrary to the hitherto-accepted belief, lowers blood-pressure as it paralyzes the vasomotor centres and stimulates respiratory centres. Chloroform paralyzes both centres.

L. Brunton,[6] claims that chloroform is a protoplasmic poison. Death occurred rapidly in those monkeys which had plaster bandages about their chest and abdomen, in imitation of women's stays. Physiologically, ether and chloroform are nearly the same, except in intensity. The examination of the urine before administering chloroform is a safer guide than the examination of the heart. He thinks the question cannot be finally settled either from the purely clinical or the purely experimental point of view, but that both should be investigated together.

H. C. Wood and H. A. Hare,[9] in speaking of the cause of death from chloroform, state there is no essential difference. At first, whether chloroform is inhaled or injected into the jugular vein, in both a primary fall of blood-pressure is produced, due to reflex inhibition of the heart or the vasomotor centres, and a second-

ary rise, due, probably, to reflex vasomotor spasm. This reflex inhibitory arrest is never permanent. Chloroform has little or no influence on the vagus; it affects the heart directly, and also the vasomotor system. Their experiments show that chloroform acts as a powerful depressant both to the respiration and the heart,—sometimes more on the heart, sometimes more on the respiration, and occasionally with equal force on both. They explain their different results from those of the Hyderabad Commission, by suggesting the possibility that Indian dogs may be differently influenced by chloroform than those of Europe and America; for if 450 of them have died of respiratory failure from chloroform in India, as many in America have died of cardiac arrest. They think it highly improbable that man is ever killed by chloroform through reflex inhibition of the heart.

MacWilliam $_{\text{Oct. 11}}^{2}$ draws the following general conclusions: 1. During chloroform anæsthesia, the blood-pressure is lowered and the heart's action weakened. 2. Dilatation of the heart occurs even when chloroform is given gently, mixed with abundant air. 3. Dilatation may occur before conjunctival reflex is abolished. Dilatation affects all parts of the heart; it is not due to the fall in blood-pressure nor to diminished resistance of ventricular systole, nor to diminished blood-supply to coronary arteries; it occurs often very rapidly, and is not relieved by raising the blood-pressure. Cardiac failure occurs by a sudden enfeeblement and dilatation of the organ. Though respiration generally ceases before heart-failure occurs, sometimes the latter takes place a considerable time before the former. The greatly-dilated heart fails to keep up the circulation, though rhythmic movements may still continue. The distended and enfeebled heart explains the failure of artificial respiration in some cases. This depressing effect upon the heart is due directly to the action of chloroform on the cardiac mechanism. Ether will not produce dilatation, but rather tends to stimulate the heart's action.

Robt. Kirk $^{213}_{\text{Nov.}}$ gives four points to be considered in connection with the inhalation of the vapor of volatile substances: First, action, and, second, reaction of substance absorbed; third, action, and, fourth, reaction, of vapor in lungs or some part of respiratory tract. A reverse order does occur, and herein lies the enigma of chloroform syncope. He holds that there is a serious source of

danger from chloroform, in addition to asphyxia or overdose, and that is to charge the air in the lungs with vapor, to allow it a short time to act, and then to let it escape by permitting the patient to breathe fresh air. The elimination of chloroform never takes a longer time than does its absorption by the lungs. The after-effect may, therefore, be relatively twice as long after a brief inhalation of one minute than after a much longer one. There is no chloroform in the blood of those who fall victims to the primary syncope. There should be a continuous atmosphere of not less than 2½ per cent. until deep anæsthesia is induced. The pulse must be watched for sudden increase, and not at the wrist, but at the heart itself, because a pulse of 200 is difficult to count at the wrist. There is no necessity of watching the respiration during the early stage, when the patient may refrain from breathing for a whole minute without harm. The struggling stage, however, is different, and is overcome by simply continuing the anæsthesia. The conclusions of the Hyderabad Commission involve the subject in greater darkness and confusion than existed in the days of Snow and the London Committee.

Laborde $_{\text{June 10,17}}^{10}$ says that it is degeneration of the heart-muscle rather than valvular diseases that causes danger with chloroform. The danger is often through direct action on the nasal and buccal mucous membrane as a mechanical irritant, like ammonia; to relieve this, opium stands at the head, best combined with atropine. A preparation of narceine, in a soluble form, is used with more safety and has not the bad after-effects of morphine and atropine. Cocaine, as a local anæsthetic, applied directly to the nasal mucous membrane, is also very beneficial before giving chloroform.

Before the Académie de Médecine, Laborde $_{\text{May 28}}^{3}$ showed that when a monkey had chloroform brought near to his nose his heart was immediately arrested by the irritative action of the vapors on the nasal filaments of the trigeminus; and again, when this nerve was cut, this action did not occur. With ether this phenomenon is less, and with methylene chloride it is not noticed. To which Verneuil replied that the experiments on animals did not explain the action on man.

A. Guérin $_{\text{July 16}}^{3}$ proposes, in order to prevent chloroform from affecting the filaments of the nasal nerves, to hold the nostrils

of the patient closed, so that the vapors pass through the mouth exclusively until the sensitiveness is brought in abeyance; while L. Labbé[3 July 16] gives chloroform in very small doses, and continuously, thus preventing the reflex actions at the commencement.

F. François[3 June 28] holds that the irritation of the primary respiratory passages by the vapors of chloroform may in itself be grave. Asphyxia can result through spasm of the larynx, the bronchioles, and the pulmonary vessels. The heart, whether arrested or not, may be irreparably dilated. The aortic and mitral lesions are of but little importance if the heart-muscle is sound. Tricuspid regurgitation is, however, most dangerous, because of the respiratory troubles accompanying it. All cardiac diseases are dangerous if the heart-muscle is affected. With pleuro-pulmonary lesions, spasms arising from irritation of the naso-pharyngeal mucous membranes may induce death. Cocaine applied to these mucous membranes may prevent all irritation.

The primary arrest of the heart in chloroform narcosis is claimed to be due by Wm. Koch[60 Apr. 3] to disease of the ganglionic centres. There must be a decided grade of disease to produce death. Patients suffering with these lesions are said to have weak hearts without valvular disease; it is necessary, therefore, to exercise great care in all cases in which exhaustive or cachectic conditions exist. If the patient does not revive after a half-hour's artificial respiration, he may be considered dead. When the heart stops first, cold douches, hot compresses, electricity, and inversion should be practiced.

O. Hagen-Torn[21 Mar. 21] considers that where there is no lack of compensation and no degeneration of the heart-muscle, there is no danger with chloroform. It is dangerous because it is generally given in a haphazard way, without regard to dosage. Were other drugs given in the same reckless manner, they would also give rise to untoward symptoms. The cause of death from chloroform is "cessation of the centres;" therefore, no medicinal antidote will avail.

Baudouin[100 June 7, 14] recommends giving chloroform in drop doses, continuously, with the least possible amount of air, and to use the smallest possible amount of chloroform. He claims that in this manner the commencement is not disagreeable; there is no period of excitement, no vomiting, absolute anæsthesia is easily

obtained, and no more than 15 to 20 grammes (3 drachms 51 grains to 5 drachms 9 grains) are necessary for an ordinary operation. The sleep may thus be prolonged for many hours. After waking there is no disagreeable feeling. Chloroformization is thus rendered harmless, and persons suffering from cardiac or respiratory diseases can be anæsthetized without danger.

In regard to the fatal after-effects from chloroform, Thiem and Fischer [41, Dec. 2, '99] state that the urine can show evidences of chloroform even twelve days after the narcosis, and as long as this toxic material is in the system danger from it is to be feared. Chloroform reduces Fehling's solution to black oxide of copper. It can be detected six hours after administration, and after prolonged narcosis it may be found for from three to eight days. The isonitric reaction shows that it exists in the urine in an unchanged condition. They deduce that chloroform should be looked upon as a necessary evil, and not be employed if it can be avoided; also that a person should not receive chloroform again until the previous amount is entirely eliminated, as shown by its action on Fehling's solution.

In the urine of persons under chloroform narcosis for a protracted period, *i.e.*, one and a half to two and a half hours, Kast [34, Dec. 2, '99] found a very decided increase in organic and inorganic sulphates. He believes that the tissue changes are materially affected by prolonged chloroform narcosis.

Iterson-Leiden [69, Apr. 8] claims that chloroform vapors are broken up into chlorine and carbonic oxide by the effect of gaslight. This causes bronchial irritation in those present, induces asphyxia in the narcotized patient, and has even produced death. Sometimes the injurious effects will only manifest themselves some days after. Two cases are cited by Wade [192, May] in which, through the chloroform vapors coming in contact with gaslight, the patients became dyspnœic and the assistants suffered from bronchial irritation.

The products of the decomposition by gaslight are stated by Kunkel [34, Apr. 4] to be hydrochloric acid and carbon dioxide; carbon monoxide is never found. It requires only 0.1 per 1000 of hydrochloric acid to produce bronchial irritation, and to produce this only 10 grammes (2 drachms 34 grains) of chloroform in 70 cubic centimetres of air are required. A. Kelly [59, Mar. 30] reports a case where chloroform had been administered to a boy, 15 years old,

while he was asleep. The chloroform did not arouse him; he continued sleeping calmly until he was aroused, with some difficulty, after the operation, which was for the removal of a foreign body from the bladder.

A case of chloroform narcosis during sleep was reported by J. W. Carhart. [50] A child 3½ years old was chloroformed during sleep; a fracture of the right thigh was placed in a soda-silicate splint, and patient did not awake during that time, nor was there excitement or struggle. After the anæsthetic was withdrawn, the patient awoke without indications of having had any other than a natural sleep.

Hewitt [6] reports 130 deaths from chloroform in Great Britain in the years 1880 to 1889, among which were 54 in minor operations. He claims that cases of cardiac depression, not due to chloroform, can only make themselves known through the pulse. Cases of reflex syncope may arise in most profound chloroform narcosis; in these the pulse, if carefully watched, gives warning of approaching danger before the respiration is seriously affected.

Stopping of the pulse does not necessarily mean cessation of the heart's action. The Hyderabad Commission has made a grave mistake by calling chloroform such a safe anæsthetic, and in disregarding the indications afforded by the pulse. In giving such rules, the inexperienced rather than the experienced should be thought of.

The results of the observations of J. Dunlop, [6] in the Royal Infirmary and other institutions of the city of Glasgow, are to the effect that chloroform is never absolutely safe, that it is more dangerous than ether during operations, while ether is more dangerous after operations. The deaths by chloroform have increased in the last ten years. There were 8 or 9 since January 1, 1888. In deaths from asphyxia the right side of the heart is full of liquid blood of a pinkish tinge, not as in asphyxia from drowning, where it is dark; there is also a general engorgement of the veins, and the left side of the heart is empty and firmly contracted.

In deaths from syncope there is a flaccid, empty heart; no blood on the right side, but the veins are filled.

Deaths from asphyxia occur either from the too long continued inhalation of chloroform or by bringing the patient too deeply under

its influence at the start. Again, there may have been proper care at the start, the patient seemingly coming out from its influence, but a second excessive dose may be given. Both these conditions should be preventable with care. Deaths from syncope are mostly beyond control.

The following statistics from the St. Bartholomew's Hospital are given by T. Brown Henderson[213 Nov.]: Chloroform was given 17,666 times with 12 deaths; ether, 7493 times with 1 death; gas and ether 12,806 times with 1 death. He considers one of the difficulties of chloroform anæsthesia is the uncertainty of the quantity necessary to induce narcosis.

Our corresponding editor, P. J. Diakonoff, of Russia, has collected 95 deaths from chloroform between 1877 and 1888. He finds that four times as many males as females are thus affected. According to age, they range as follows: 1.02 per cent. from 1 to 5 years; 13.27 per cent., 5 to 15; 19.9 per cent., 16 to 30; 23.98 per cent., 31 to 45; 21.43 per cent., 46 to 60; 0.51 per cent., over 60. Death occurs mostly during complete anæsthesia. 54 cases died of syncope; 18 of asphyxia; in 13 heart and respiration ceased simultaneously. He finds that atropine gives negative results, and recommends that saline injections into the circulation should be employed in syncope.

The following deaths from chloroform have been reported since the last issue of the ANNUAL: 1. [73 July 14] Date of death not given; male, aged 46; operation for inguinal hernia; pulse stopped first; autopsy negative. 2. [2 June 21] June 5th, 1890, child, 5 months old; during external examination of abdomen; heart and respiration ceased simultaneously; autopsy negative. 3. [6 Dec. 14, '89] December 2d, 1889, female, aged 41; operation not stated; heart and respiration arrested at the same time; no autopsy. 4. [26 Mar.] February 1st, 1890, female, aged 24; operation for lupus, with stertor and paralysis of respiration; autopsy negative. 5. [59 Mar. 15] July 2d, 1889, male, aged 5; operation for tubercular sinus; respiration stopped first, then pulse; no autopsy. 6. [59 Mar. 15] June 19th, 1889, female, aged 2; operation for spina bifida; pulse feeble, respiration stopped; autopsy negative. 7. [12 Apr.] November 18th, 1889, male, aged 41; operation for epithelioma; respiration ceased, and pulse some time after; autopsy, right lung tubercular. 8. [6 May 8] April 22d, 1890, male, aged 39; operation for tumor on shoulder; death from pul-

monary paralysis; autopsy, fatty heart. 9. $^{779}_{Oct.}$ September 29th, 1889, male, aged 68; operation suprapubic cystotomy; manner of death, pulse and respiration ceased at the same time; no autopsy. 10. $^{779}_{Oct.}$ March 27th, 1890, male, aged 44; anæsthesia for tetanus from leg ulcers; heart-failure; no autopsy. 11. $^{779}_{Oct.}$ July 23d, 1890, male, aged 52; operation for tubercular abscess; heart-failure; autopsy, contracted kidneys; also, tuberculosis of right lung. 12. $^{9}_{Sept.18}$ July, 1890, male; operation for tuberculosis of bone; respiratory failure; autopsy, tubercular disease of vertebra. 13. $^{6}_{Oct.18}$ October, 1890, child, aged 10; operation for knock-knee; cardiac failure; no autopsy. 14. $^{801}_{May}$ February 15th, 1890, female; operation on thumb; no cause of death given, nor result of autopsy. 15. $^{801}_{May}$ February 15th, 1890, female, operation; cause of death and result of autopsy not stated. 16. $^{6}_{Oct.11}$ August 12th, 1890, male, aged 40; operation for perineal fistula; pulse ceased first, respiration 45 minutes after; autopsy, tubercular lungs. 17. $^{6}_{Nov.8}$ November, 1890, male, aged 24; operation, urethrotomy; respiration and heart stopped at the same time; autopsy, leukæmia. 18. $^{6}_{Nov.22}$ November 10th, 1890, male, aged 7; amputation of thigh; no direct cause of death or result of autopsy given. 19. $^{6}_{Aug.30}$ August, 1890, female, aged 60; amputation of finger; respiration failed; no autopsy. 20. $^{6}_{Aug.30}$ August, 1890, male; operation for tumor in throat; obstruction of air-passages given as cause of death. 21. $^{2}_{Nov.8}$ October 1st, 1890, male, aged 36; operation for fractured patella; pulse ceased; autopsy, fatty heart. 22. From Bardeleben's clinic, December 4th, 1889, male; abscess of hand; cause of death not given; autopsy, incipient pneumonia. 23. $^{6}_{Nov.1}$ October 11th, 1890, male, aged 64; reduction of luxation of femur; death from heart-failure; autopsy, heart had very thin walls. 24. $^{6}_{Nov.1}$ No date given; male; for enucleation of eye; manner of death not stated; results of autopsy not given. 25. $^{6}_{Nov.1}$ St. Mary's Hospital, Paddington; male; operated for fractured patella; 1½ drachms (5.83 grammes) chloroform administered, when heart ceased after a half-minute's unconsciousness.

ETHER.

Robert Weir $^{1}_{Mar.1}$ considers that the occurrence of albumen in the urine after ether anæsthesia is due to the operative procedure more than to the effect of the anæsthetic; also, that in the few instances of marked renal complication following ether narcosis the oper-

ations had been performed in parts of the body, such as the mouth and rectum, where sepsis was most likely to result. When the kidneys are damaged beforehand, the avoidance of cold and venous congestion is necessary. In operations, fluids should not be too long abstained from, and strict antiseptic precautions should be observed. The contra-indications mentioned by Kappeler do not hold good against ether. They might just as well apply to chloroform, for anæsthesia by the latter is no less dangerous in cases with diseases of heart, brain, lungs, with epileptics, uræmics, the aged, and the very young, as by ether. There are absolute contra-indications, or, rather, risks, with both agents, amongst which fatty heart is the most absolute one, but even here ether is to be preferred. Ether, in his opinion, is to be employed with preference in infants. St. Germain states that he has chloroformed 6000 infants without a single death. For the same period of life, *i.e.*, up to 12 years, however, there is not one death recorded from ether, while from chloroform there are 21 deaths found in literature. Arterio-sclerosis does not constitute a contra-indication for the use of ether, and it has been given in renal troubles many times without serious results. When only small quantities of ether are employed at one time, and after insensibility is obtained, if the inhaler be enveloped in a towel, the thermo-cautery can be used quite safely, as has been done about 200 times in the clinics at Geneva, without accident. The deaths by chloroform occur, in the majority of cases, in young, robust, and healthy persons, for light or trifling operations, and before complete chloroform narcosis is obtained. Ether deaths are met with usually in persons over 50 years of age, can be explained at times by the disease, occur usually only in grave operations, and are generally accounted for by lesions found at the autopsy.

J. R. Comte[197] considers that ether narcosis is not produced by asphyxia, and that the pupil is a valuable guide in conducting it; when it dilates, the ether ought to be stopped. It should be given slowly, from 25 to 30 cubic centimetres (5¾ drachms to 1 ounce) to be thrown on the inhaler at first, which is gradually brought nearer to the face; then a second dose, and so on, until anæsthesia is complete, which usually takes about six minutes. While of 232 deaths by chloroform 22 occurred in reduction of luxations, not one ether death took place under similar circumstances. He is not

in favor of the method of Dumont, who secures narcosis in less than two minutes by great quantities of ether, given at one time, and thinks the exciting stage with ether is no greater than with chloroform. It seems to him better to have a stage of excitement than one of depression, so often noticed with chloroform.

George Fowler[157 Feb.] concludes that ether for surgical purposes is less dangerous than chloroform, and more generally applicable. He uses chloroform only for short operations. Young subjects not affected with degenerative diseases can take chloroform, but may take ether just as well. In aged persons suffering from pulmonary affections he recommends chloroform to begin with and ether to continue with if the operation is a long one. In cases with degenerative disease of the kidneys and heart, and no pulmonary complication, ether should be used.

In 500 etherizations at the Dresden Hospital, Butter[226 V.40,p.66; 90 July] noted the following facts:—

Complete unconsciousness resulted usually in two and one-half minutes, with an average amount of 68.9 grammes (2 ounces 1 drachm 42¾ grains) of ether used. The average duration of the narcosis was 20.9 minutes. Patients recovered in about five minutes after the removal of the mask; in one-sixth of the cases there was vomiting.

J. A. Squire[6 Feb.22] has given ether during the campaign at Suakim at temperatures often of 100° F. (37.8° C.) in the shade, and never experienced any great difficulties with it; contrary to the statements of Lauder Brunton, who claimed that ether could not be used for anæsthesia in hot climates.

Harrington[99 Nov.6] reports 40 cases of minor surgical operations performed during the primary ether anæsthesia. After a dozen or more rapid breaths from a sponge containing 1 ounce of ether, the patient is asked if ready, and the question repeated until the patient either responds "yes" or not at all. Vomiting rarely occurs in this way, and in the 40 cases 37 felt no pain whatever.

Two cases of mania following ether inhalations are reported by W. A. Gorton.[278 Apr.] One occurred in a boy 14 years of age, who had suffered from measles previous to entering the hospital. He had some carious teeth removed under ether, with the result of subacute mania, ending in dementia. The second case was that of a young girl 22 years of age, who had no family history of

insanity. She took ether to have teeth extracted, inhaling a large quantity for that purpose. A change in disposition took place two days afterward; she became dramatic in speech and lost flesh for some fourteen months, when one day she had delusions and became maniacal, but improved in about one year.

But two deaths from ether have been reported during the past year,—one by E. S. Perman[370 May]: the case of a woman aged 44, in an operation for resection of the pylorus; "rapid pulse from collapse." In this case chloroform had first been given. The other from the Wolverhampton and Staffordshire General Hospital: the case of a man aged 21, during an operation for chronic abscess of the knee; the patient died from syncope; the autopsy revealed a fatty heart.

COCAINE.

T. H. Manley[99 Nov. 18] states that, in his hospital service, he has practically discarded the use of general anæsthetics, except in those cases requiring much time and in capital operations. The following operations have been performed by him under cocaine: 3 herniotomies, 1 hydronephrotic cyst (opening), 4 fistulæ in ano, 2 pleurotomies, 1 suprapubic incision into bladder, removal of cancer from lower lip, urethrotomy, 1 laparotomy for cyst of broad ligament, gunshot wound of thorax with resection of fragments of ribs, 4 lithotomies, and some 30 minor operations. The method employed is that of Reclus, with an elastic constrictor when operating on a limb; before injecting, in other cases, the tissues are first sprayed with a siphon of ice-cold Vichy water, which so benumbs the parts that the hypodermic needle is not felt. Six to 12 centigrammes ($\frac{9}{10}$ to $1\frac{1}{5}$ grains) of cocaine are necessary; some experience is also required in administering it. Ludwig Pernice,[69 Apr. 3] after the use of cocaine in 1000 cases, shows that from 0.01 to 0.02 gramme ($\frac{1}{6}$ to $\frac{1}{3}$ grain) of pure cocaine is sufficient for minor operations, and that this small quantity does not show the slightest symptom of intoxication; the anæsthesia lasts eight to ten minutes if the cocaine be injected deeply, but three to four minutes elapse before it takes effect. The less vascular the part, the more intense its action; but there is no result in inflamed tissues, and the healing process is not impaired by it.

Anton Bleichsteiner[8 Sept. 11] mentions 3000 injections of cocaine made by him in two years; of these 5 per cent. failed. He uses

it for extraction of teeth, and considers anæsthesia complete when the gums become white; not more than 0.05 gramme ($\frac{1}{6}$ grain) should be used at one dose for this purpose.

Dugald Christie[235] amputated a penis for epithelioma under injections of a 5-per-cent. solution of cocaine into the urethra and around the seat of incision, using about 20 minims (1.3 grammes) in all. The patient did not experience the slightest pain.

Albers[41] claims that cocaine acts especially on the sensory nerve-endings and paralyzes them, while the motor nerves are not or only very slightly affected, and it should therefore come directly in contact with the delicate nerve-endings in the rete Malpighii and the injections be made into this.

Franc[188] recommends cocaine as a local anæsthetic in obstetrics. If applied to the neck of the uterus before dilatation it lessens pains connected with this process; if applied to the vulva and vagina during expulsion it lessens the pains very much. He used a 5-per-cent. solution for the neck every half-hour, applied to the inferior segment, and the vaginal *cul-de-sac* is filled with a tampon soaked in the solution; for the perineum, 10- to 20- per-cent. solutions are necessary, and 20 to 30 drops are applied at a time. Arthur Harris[6] proposes to utilize cataphoric action to induce local anæsthesia with cocaine. He soaks the positive pole with cocaine solution and then applies a constant current for some forty minutes.

Delbose[212] quotes 5 deaths from cocaine; 1 case in which 0.05 gramme was used is supposed to have resulted fatally from cerebral apoplexy. The other 4 were due to large doses varying from 0.75 to 1.50 grammes. He recommends for the evil effects amyl nitrite, injections of ether and caffeine.

Another death from cocaine is reported.[211] A dentist administered cocaine to a young girl to extract teeth, when in the midst of the operation the patient suddenly became faint and fell dead into the arms of a by-stander. The court exonerated the dentist from homicide, but fined him for practicing medicine.

ETHYL BROMIDE.

E. Haffter[214] thinks ethyl bromide a valuable anæsthetic, and when physicians are once familiar with the method of administering it they will not be apt to abandon it for other anæsthetics.

Its principal advantages are rapidity of action, probable absolute freedom from danger, and absence of the stage of excitement during its use. A rapid analgesic effect, with consciousness, may be brought about with from 5 to 20 grammes ($1\frac{1}{4}$ to 5 drachms) held closely to the mouth. A small percentage of persons are not fit for ethyl-bromide narcosis, especially drunkards.

Thiem [41 July 17] thinks the name of ethyl-bromide hypnotism more suitable than ethyl-bromide narcosis, as, like hypnotism, it will not take effect upon many individuals; even after being administered to some persons for quite a while, it will not produce a true narcosis in which a major operation can be performed. He also finds that the malaise following its use is quite prolonged, and vomiting occurs very often. Bloody diarrhœa has appeared as soon as a half-hour after its use and has persisted for some days. He concludes that for short minor operations it is useful, but if, after six minutes, the sensations are not dulled, *i.e.*, a hypnosis is not induced, it should not be used further, as a narcosis from it is dangerous, and he thinks it should not be employed.

Kocher [214 Sept. 15] states that ethyl bromide produces anæsthesia in thirty to sixty seconds, and thinks it will be best, when complete, to continue with ether; there will then be no interruption of the anæsthesia. The pulse demands great attention, just as in other anæsthetics, for ethyl is not less dangerous than chloroform in the commencing stages.

Haderup [96 Nov.] considers ethyl bromide contra-indicated in diseases of the lungs and heart. He has used it in over 100 cases, and found it without danger and without after-effect.

NITROUS OXIDE.

Silk [6 June 21] quotes 1000 cases of nitrous-oxide anæsthesia, among which there were 3 with epilepsy in which it caused no attack, and 3 cases of phthisis in which no abnormal symptoms developed. In 1 case of valvular heart trouble syncope occurred but once, though he used gas four times; in 9 cases of pregnancy nothing occurred; in 1 case of lactation it produced a bilious attack, and the infant suffered from malaise the following day. He also states that the average quantity used was 4 to 5 gallons, and the average time that the mouth-piece was in position 67.5 seconds. Opisthotonos is common in females; wide dilatation of pupil was observed

in 797 cases, micturition in 10 cases,—all females; erotic movements were present in 6 females. There was no after-effect, except slight headache in some cases.

If pure nitrous oxide is administered to animals, says George Brush, [157 May] respiration will become labored in three minutes and soon cease; the action of the heart, however, continues, and, with artificial respiration, natural breathing is induced again in less than three minutes.

He states that anæsthesia can be obtained with nitrous oxide and atmospheric air combined in proper proportions, and that the cyanotic appearance is due not to CO_2 poisoning, but to the diminished amount of oxygen inhaled.

Wood and Cerna [59 May 31] conclude, from a series of experiments, that nitrous oxide and nitrogen act by shutting off oxygen; the blood changes resemble those caused by mechanical asphyxia, but they are not quite identical. They found that the addition of 10 per cent. of oxygen was sufficient to prevent anæsthesia, and think that there is not sufficient reason to call nitrous oxide a direct anæsthetic.

H. C. Wood, [9 Aug. 9] before the International Medical Congress in Berlin, stated that with the many million inhalations of nitrous oxide, only 3 deaths have been recorded; great caution should be observed, however, in persons where there exists disease of the arteries.

LOCAL ANÆSTHETICS.

P. J. Diakonoff, of Russia, corresponding editor, reports the researches of S. Beresowsky [571 No. 18] on dogs with methyl chloride, in regard to its local anæsthetic effect. Beresowsky concluded that methyl chloride produced local anæsthesia much quicker and more lasting than ether, so that more protracted operations may be performed under it, as it can easily be re-applied. Another advantage claimed for it is that it does not take fire like ether, and may be employed in the neighborhood of fire and the actual cautery.

Dobisch [169 July] recommends, as a mixture for local anæsthesia, the following:—

Chloroform, ...	10 parts.
Ether, ...	15 "
Menthol, ...	1 part.

METHYL CHLORIDE.

R. H. Hughes[6 Oct. 21] reports a death from methylene in a male patient, aged 51, during an amputation of the leg. After inhaling about 3 drachms (12 grammes) for about three minutes, the patient struggled violently and became cyanosed; a minute later the pulse and respiration ceased. The necropsy showed thin heart-walls, congestion of various organs, and cirrhosis of liver.

T. Spencer Wells[6 Oct. 25] attributes this death to the form of inhaler used, which did not allow proper dilution of the vapors, and recommends that Junker's inhaler should be employed.

ETHYL AND METHYL FLUORIDE.

Henri Moissan[276 June 20] finds that ethyl fluoride and methyl fluoride have anæsthetic properties similar to the chlorides of these radicals. Ethyl fluoride, however, is very toxic, and methyl fluoride is the better anæsthetic of the two.

OUABAIN AND STROPHANTHIN.

A correspondent from Paris[80 Apr.] states that Gley investigated the anæsthetic effect of ouabain and strophanthin, and showed that thermic insensibility does not always disappear with insensibility to pain. He finds, also, that they augment intra-ocular pressure; the eye of a rabbit will increase in size and project from the orbit for several hours after a few drops of ouabain or strophanthin solution have been instilled into it.

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464. Revista di ostetricia e ginecologia, Torino.
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471. Bulletins de la Société de médecine pratique, Paris.
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492. Druggists' Bulletin, Detroit.
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503. El siglo médico, Madrid.
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505. Gazzetta degli ospitali, Naples.
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507. Giornale italiano delle malattie veneree e della pelle, Milan.
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523. Kinesithérapie, Paris.
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560. Pharmaceutische Post, Vienna.
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575. Pharmaceutische Centralhalle für Deutschland, Berlin.
576. Gesundheits-Ingenieur, Munich.
577. Union médicale du nord-est, Rheims.
578. Revista médica de Chile, Santiago, Chili.
579. Vereinsblatt der pfaelzischen Aerzte, Frankenthal.
580. Revue sanitaire de la Province, Bordeaux.
581. Pharmaceutical Record, London.
582. Journal da Sociedade das sciéncias medicas de Lisbon.
583. Nederlandsch Tijdschrift voor Geneeskunde, Amsterdam.
584. World's Medical Review, Philadelphia.
585. Revue scientifique et administrative des médecins des armées de terre et de mer, Paris.
586. Wratsch, St. Petersburg.
587. Répertoire de thérapeutique, Paris.
588. Wiadomosci lekarskie, Lwow.
589. Riforma medica, Naples.
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592. Zeitschrift für die Behandlung Schwachsinniger und Epileptischer, Dresden.
593. Kjobenhavenske medicinske selskabs förhandlingar, Copenhagen.
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595. Zeitschrift für Geburtshülfe und Frauenkrankheiten, St. Petersburg.
596. Rivista clinica e terapeutica, Naples.
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605. Archivio di psichiatria, scienze penali ed antropologia criminale, Torino.
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608. Revue internationale scientifique et populaire des falsifications des denrées alimentaires, Amsterdam.
609. Archiv für Anatomie und Entwickelungsgeschichte, Leipzig.
610. La medicina contemporánea. Revista médica de Reus.
611. Medical Current, Chicago.
612. Archivios de medicina y cirurgia de los niños, Madrid.
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618. Crónica médica de Valencia.
619. Revista médico-farmacéutico de Aragon, Zaragoza.
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623. Der Militärarzt, Vienna.
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661. Annales da Academia de medicina do Rio de Janeiro.
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714. Archivio Bizzozero, Naples.
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804. Monatsschrift des Vereins deutscher Zahnkünstler, Leipzig.
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806. Archives of Surgery, London.
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808. International Dental Journal, Philadelphia.
809. American Journal of Dental Sciences, Baltimore.
810. Quarterly Journal of Microscopical Science, London.
811. Toledo Medical and Surgical Reporter, Toledo, Ohio.
812. Biologiska föreningens förhandlingar, Stockholm.
813. Dublin Medical Press.
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817. Canada Health Journal, Ottawa.
818. Journal of British and Foreign Health Resorts, London.
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820. La medicina popular, Barcelona.
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824. Journal des maladies cutanées et syphilitiques, Paris.
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829. Pharmaceutical Journal of New South Wales.
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834. La psichiatria, Naples.
835. Revista de medicina dosimetrica, Madrid.
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844. Oesterr -ungar. Centralblatt für die medicinischen Wissenschaften, Vienna.
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859. Bolnitchnaja gazeta Botkina.
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